ALAMO INDUSTRIAL

SWITCH BLADE

5 ft. & 6 ft. Sickle Bar Mower

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SERVICE MANUAL

ATTENCIÓN!

Si No Lee Ingles, Pida Ayuda a Alguien Que Si Lo Lea Para Que le Traduzca las Medidas de Seguridad.

LEA EL INSTRUCTIVO

An Operator's Manual was shipped with the equipment in the Manual Canister. This Operator's Manual is an integral part of the safe operation of this machine and must be maintained with the unit at all times. READ, UNDERSTAND, and FOLLOW the Safety and Operation Instructions contained in this manual before operating the equipment. If the Operator's Manual is not with the equipment, contact your dealer or Alamo Industrial (830-379-1480) to obtain a Free copy before operating the equipment.

ALAMO INDUSTRIAL
1502 E. Walnut
Seguin, Texas 78155
830-379-1480

MEMBER OF THE ALAMO GROUP
ALWAYS ON THE CUTTING EDGE

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TO THE OWNER/OPERATOR/DEALER

All implements with moving parts are potentially hazardous. There is no substitute for a cautious, safe-minded operator who recognizes the potential hazards and follows reasonable safety practices. The manufacturer has designed this implement to be used with all its safety equipment properly attached to minimize the chance of accidents.

BEFORE YOU START!! Read the safety messages on the implement and shown in your manual. Observe the rules of safety and common sense!

DANGER
FAILING TO FOLLOW SAFETY MESSAGES AND OPERATING INSTRUCTIONS CAN CAUSE SERIOUS BODILY INJURY OR EVEN DEATH TO OPERATOR AND OTHERS IN THE AREA.
1.
READ MANUAL
2. NO RIDERS. NO CHILDREN OPERATORS.
3. USE SAFETY SHOES, HARD HAT, SAFETY GLASSES, SEAT BELTS, & ROPS
4. BLOCK UP SECURELY BEFORE WORKING UNDER.
1. Study and understand operator's manual, safety signs, and Instructional decals for tractor and implement to prevent misuse, abuse, and accidents.
● Learn how to stop engine suddenly In an emergency. Be alert for passerby and especially children.
2. Allow no children on or near Implement or tractor. Allow no riders on tractor and implement. Falling off may cause serious injury or death from being run over by tractor or cutter or contact with rotating blades.
3. Operate only with tractor having Roll-Over Protective Structure (ROPS) and with seatbelt fastened securely and snugly to prevent injury and possible death from falling off or tractor overturn. Personal Protective Equipment such as Hard Hat, Safety Glasses, Safety Shoes, and Ear Plugs are Recommended.
4. Block up or support raised machine and all lifted components se curely before putting hands or feet under or working underneath a ny lifted components to prevent crushing Injury or death from sudden dropping or inadvertent operation of controls. Make certain area is clear before lowering or folding.
5. Before transporting, put Lift Lever in detent or full-lift position. Secure the implement for transport by installing Cylinder Stops or Transport Pin on Pull-type implement center axle and Wing Transport Locks on folding implements.
● Attach Safety Chain to cutter and towing unit securely. See Operator's Manual.
6. Make certain that the SMV sign, Warning Lights, and Reflectors are clearly visible. Follow local traffic codes.
7. Never operate with Cutting Head raised if passerby, bystanders, or traffic are in the area to reduce possibility of injury or death from Objects thrown by Blades under Guard or cutter structure.
8. Before dismounting, secure implement in transport position or lower to ground.
● Put tractor in park or set the brake, disengage PTO, stop engine, and remove key, and wait until noise of rotation Has ceased to prevent entanglement in rotating parts which can cause injury or death.
● Never mount or dismount a moving vehicle. Crushing from runover may cause injury or death.
5. TRANSPORT SAFELY, LOCK UP.
6. USE SMV, LIGHTS, & REFLECTORS.
7. DO NOT OPERATE WITH CUTTER OR WING RAISED.
8. DO NOT MOUNT OR DISMOUNT WHILE MOVING.
00749117

WARRANTY INFORMATION:

Read and understand the complete Warranty Statement found in this Manual. Fill out the Warranty Registration Form in full and return it to within 30 Days. Make certain the Serial Number of the Machine is recorded on the Warranty Card and on the Warranty Form that you retain.

INTRODUCTION

ABOUT THIS MANUAL:

The intent of this publications to provide the competent technician with the information necessary to perform the CORRECT repairs to the Alamo Industrial Product. This will, in turn provide for complete customer satisfaction

It is hoped that the information contained in this and other Manuals will provide enough detail to eliminate the need for contact of the Alamo Industrial Technical Service Dept. However, it should be understood that many instances may arrive wherein correspondence with the Manufacturer is necessary.

CONTACTING MANUFACTURER: (Please help us Help You! Before You Call!)

Alamo Industrial Service Staff Members are dedicated to helping you solve yours or your customer's service problem as quickly and efficiently as possible. Unfortunately, we receive entirely to many calls with only a minimum amount of information. In some cases, the correspondent has never gone out to look at the equipment and merely calls inquiring of the problems described to him by the operator or customer.

PART NUMBERS: Part numbers listed in this manual are subject to change without notice as designs are made to adapter to the tractor or for a design improvement. Before ordering parts ALWAYS Measure old part to make certain that is the one you will need. This manual is designed to be used along with the Parts and Operators Manual.

Most calls received by Alamo Industrial Service can be classified into approx. 6 general categories.

1. Hydraulic or Mechanical Trouble Shooting.
2. Request for Technical Information or Specifications.
3. Mounting or Fitting Problem.
4. Special Service Problem.
5. Equipment Application Problems.
6. Tractor Problem Inquiries.

HOW YOU CAN HELP:

Make sure the call is necessary! Most of the calls received may not be necessary if the Dealer Service Technician would do the following.

1. Check the Service Information at your Dealership provided by Alamo Industrial, This would include, Service Bulletins, Information Bulletins, Parts Manuals, Operators Manuals or Service Manuals, many of these are available via the Alamo Industrial Internet site (Alamo - Industrial. Com). Attempt to diagnose or repair problem before calling.

2. If a call to Alamo Industrial is needed, Certain Information should be available and ready for the Alamo Industrial Service Staff. Such information as, Machine Model, Serial Number, Your Dealer Name, Your Account Number and Any other information that will be useful. This information is vital for the development of a prompt and correct solution to the problem. This will also help to develop a database of problems and related solutions, which will expedite a solution to future problems of a similar nature.

3. The technician may be asked to provide detailed information about the problem including the results of any required trouble shooting techniques. If the information is not available, The technician may be asked to get the information and call back. Most recommendations for repairs will be based on the procedures listed in the Service Manual / Trouble Shooting Guide.

CONTACT ALAMO INDUSTRIAL:

Alamo Industrial, 1502 E. Walnut St. Seguin TX. 78155,
Technical Service Dept. PH: 830-379-1480

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INDEX

Section Page

Section 1 -Specifications..... 1-1 to 1-6
Do Not Do or Allow Items (Read First Thing)..... 1-2 to 1-3
Standard Specifications..... 1-4
Torque Wrench Use Specifications..... 1-5
Hose End Fitting Torque Specifications..... 1-6
Nut & Bolt Torque Chart 1-6

Section 2 - Mechanical / Electrical Repairs & Adjustments..... 2-1 to 2-
Introduction..... 2-2
Motor - Pump Electrical Circuit..... 2-3 to 2-6
Cutter Bar Lead Adjustment..... 2-7
Cutter Bar Pitch Adjustment..... 2-7
Cutter Bar Alignment..... 2-7
Cutter Bar Guard Adjustment..... 2-7 to 2-8
Cutter Bar Wear Plates..... 2-8
Cutter Bar Clips..... 2-9
Cutter Bar Replacement..... 2-10
Knife Repair..... 2-9
Knife Replacement..... 2-9 to 2-12
Knife Bar Replacement..... 2-10
Outer Shoe Replacement..... 2-13
Inner Shoe Replacement..... 2-13 to 2-15
Rock Guard, Clip & Wear Plate Replacement..... 2-13
Carriage Arm Replacement..... 2-16
Knife Drive Repair / Replacement..... 2-17 to 2-18

Section 3 - Cylinder & Two Spool Control Valve Repair..... 3-1 to 3-13
Introduction..... 3-2
Hydraulic Diagram..... 3-3 to 3-4
Two Spool Control Valve..... 3-5 to 3-6
Remote Control Cable (Cab Tractors)..... 3-7 to 3-9
Cylinder, Bar Tilt Cyl. P/N 0693500A..... 3-10 to 3-11
Cylinder, Curb Lift Cyl. P/N 0693400A..... 3-12 to 3-13

Section 4 - Motor Repairs..... 4-1 to 4-14
Introduction..... 4-2
Cylinder, Motor & Pump Hydraulic Circuit 4-3
Hydraulic Diagram..... 4-4 to 4-5
Motor Dis-Assembly..... 4-6 to 4-10
Motor Re-Assembly..... 4-11 to 4-14
Motor Solenoid Control Valve Assembly..... 6-7

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INDEX

Section Page

Section 5 - Pump Repair..... 5-1 to 5-12
- Introduction..... 5-2
- Hydraulic Diagram..... 5-3 to 5-4
- Pump Identification..... 5-5
- Pump Schematic..... 5-6
- Pump Dis-Assembly..... 5-7 to 5-8
- Pump Re-Assembly..... 5-9 to 5-12

Section 6 - Hydraulic Tank & Return Filter..... 6-1 to 6-7
- Introduction..... 6-2
- Hydraulic Diagram..... 6-3 to 6-4
- Hydraulic Tank Schematic..... 6-5
- Hydraulic Tank Repair..... 6-6
- Oil Level / Temperature Sight Gauge..... 6-6
- Suction Strainer..... 6-6
- Tank Access Cover & Gasket..... 6-7
- Motor Control Valve Soilenoid Assembly..... 6-7

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NOTES

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Section 1

Model Specifications

STATEMENT OF POLICY

It is the policy of Alamo Group to improve its products where it is possible and practical to do so. Alamo Group reserves the right to make changes or improvements in design and construction at any time without incurring the obligation to make these changes on previously manufactured units.

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SPECIFICATIONS - SWITCH BLADE

This manual was carefully prepared by Alamo Industrial in an effort to aid the repair technisian in keeping the performance of this mower up to the high standards for which it was designed. Its purpose is to cover safety and to give recommendations for the proper repar, care and operation of the mower. The repair person will want to be totally familiar with this manual so that they will be better able to handle day to day service adjustments, maintenance and any necessary repairs.

For the purposes of product improvement, Alamo Industrial Company reserves the right to make changes in design, material or specifications without notice and without liability therefore.

READ THIS BEFORE BEGINNING ASSEMBLY, REPAIRS OR TESTING:

The Switch Blade: The Switch Blade has an independent hydraulic system to operate the motor and the cylinder system. This system uses a tandem pump for hydraulic supply and its own independent oil reservoir. Use caution not to contaminate this system.

DO NOT

1. **DO NOT** short any wires across or allow them to be shorted out.
2. **DO NOT** attempt to jump across any wires or supply them with alternate power source.
3. **DO NOT** install higher rated fuses than are recommended by manufacturer.
4. **DO NOT** attempt to repair or adjust a component that is not intended to be repaired, example sealed components as there are no serviceable components inside.
5. **DO NOT** let anyone attempt any testing or repairs unless they are an experienced and qualified technician. Technicians must have proper tools, gauges, meters etc. to perform proper diagnosis and/or repairs.
6. **DO NOT** perform any repairs with dirty tools or in dirty area. When working on hydraulic components keeping system clean and free of contamination is important.
7. **DO NOT** start or engage system if the oil level is not at the proper level or condition. Never start or run unit low or out of oil. If installing new pumpnever start engine unless pump & system has been filled with oil, starting a pump dry will damage it.
8. **DO NOT** install / add any oil unless you know it is the correct type and the container is clean. Make certain the oil is not contaminated with dirt or any liquid.
9. **DO NOT** Make repairs if it is going to be unsafe for you or the people around you, it is the repair persons responsibility to secure the tractor and the surrounding work area. Tractor should be disabled in a way that it cannot be started until the repair technician is ready to do so.
10. **DO NOT** use teflon tape or other pipe joint tape on fittings or hose connections. For pipe threads, use a pipe thread sealant compound suitable for hydraulic service on OD thread.

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SPECIFICATIONS - SWITCH BLADE

The OCCUPATIONAL SAFETY AND HEALTH ACT (1929.51 Subpart C) makes these minimum safety requirements of tractor owners and operators:

Required of the Owner:

1. Provide a Roll-Over-Protective Structure that meets the requirements of this Standard;
2. Provide Seat belts that meet the requirements of this paragraph of this Standard SAE J4C;
3. Ensure that each employee uses such Seat belt while the tractor is moving;
4. Ensure that each employee tightens the Seat belt sufficiently to confine the employee to the protected area provided by the ROPS.

Required of the Operator:

1. Securely fasten seat belt if the tractor has a ROPS.
2. Where possible, avoid operating the tractor near ditches, embankments, and holes.
3. Reduce speed when turning, crossing slopes, and on rough, slick, or muddy surfaces.
4. Stay off slopes too steep for safe operation.
5. Watch where you are going - especially at row ends, on roads, and around trees.
6. Do not permit others to ride.
7. Operate the tractor smoothly - no jerky turns, starts, or stops.
8. Hitch only to the drawbar and hitch points recommended by the tractor manufacturer.
9. When the tractor is stopped, set brakes securely and use park lock, if available.

Safety Recommendations!

It is the business philosophy of Alamo Industrial Company to manufacture safe products for use by our customers. In the interest of your safety, we are bringing to your attention practices that can avoid serious injury. It is our belief that trained operators can avoid painful experiences by carefully reading and adhering to the following recommendations. As a repair technician do not modify this product in any way that will make this unsafe for the operator or anyone else around it.

WORK SAFELY. Most of the repairs can be performed by one man, but some of the parts are very heavy. GET HELP IF YOU NEED IT. Use the right tools for the job. A floor jack or hoist will be a big help, but make sure they are in safe condition. Keep the floor free from oil and grease so you don't slip. WEAR SAFETY GLASSES, SAFETY SHOES AND GLOVES and make sure your helper does too.

DANGER

This machine can be dangerous if not operated safely. Do not operate it until you have read and understand all safety and operation recommendations in Operators, Assembly, Service manuals.

Know the equipment, learn to operate it correctly in a safe, level, open secure area before trying to operate this unit in tight places or around other objects or people.

When stopping, shut off the mower, disengage PTO, Engage Tractor Parking brake. Shut off tractor engine and be certain all rotating or moving mechanisms have stopped before attempting to get near mower. Make certain that tractor is secured in a way that it can only be started if you are ready for it to. This could include remove key and put it in a secure place. Disconnect battery cable which should be done before any repairs or service is started.

CAUTION
1. KEEP ALL SHIELDS IN PLACE
2. STOP MACHINE TO ADJUST AND OIL
3. IF MECHANISM BECOMES CLOGGED SHUT OFF POWER BEFORE CLEANING
4. KEEP HANDS, FEET AND CLOTHING AWAY FROM POWER-DRIVEN PARTS
5. KEEP OFF MOWER AND KEEP OTHERS OFF
6. WARN BYSTANDERS TO KEEP AWAY

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SPECIFICATIONS - SWITCH BLADE

Standard Specifications: Switch Blade 5 ft. & 6 ft.

Break-A-Way Control	Break-A-Way Pressure Contol Valve Block
Break-A-Way Relief	1500 psi Relief
Break-A-Way	Hydraulic Rotary Actuator, Self Returning
Cutting Size	Up to 1/2" in Dia. Material
Cutting Width	5 ft. or 6 ft. Option
Drive System	Hydraulic Motor
Hydraulic Cylinder Control	Two Spool Control Valve
Hydraulic System	Self Contained
Hydraulic Tank	Steel Manufactured Type w/ Built in Mount
Hydraulic Filter	Standard, Tank Mounted
Hydraulic Oil Return Pressure Gauge	Standard, Tank Mounted
Hydraulic Hoses	High Pressure Standard
Hydraulic Hose Length	Varies with the Tractor Model
Knife Drive	Planetary Drive Assembly
Knife Rock Guards	3" Heavy Duty Industrial Bolt On
Knife Speed Control	Pre-Set Governor
Knife Type	Serrated Edge Standard
Lift & Fold	Hydraulic Cylinders Standard.
Motor Control	Electric over Hydraulic
Motor Control	Electric “ON” or “OFF” Selection
Motor Function	Electric Reversible Drive Direction
Mount Type	Side Mount to Tractor Standard
Mounting to Tractor	Factory or Field Mount Option
Operators & Parts Manual	Standard, Extra Copies Optional
Paint	Yellow Standard, Special Colors Optional
Pump Guard	Optional
Pump Mounting	Tractor Engine Driven
Pump Size	2 Size Option (CID)
Pump Type	Tandem Gear Pump
Pump Pressure ..... Motor Circuit	1750 psi @ 9 to 10 gpm
Cylinder Circuit	3000 psi @ 3.5 to 4.5 gpm
Skid Shoe Replacement	Bolt on
Skid Shoe Size	Standard 3/16" Abraision Resistant Alloy
Skid Shoe	Standard w/ AG Shoe & Swathboard Option
Transport Locks	Standard, Manual Lock
Transport	Hydraulic Lifting and Folding

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USING AN ADAPTER WITH A TORQUE WRENCH

How To Compute Torque When Using An Adapter

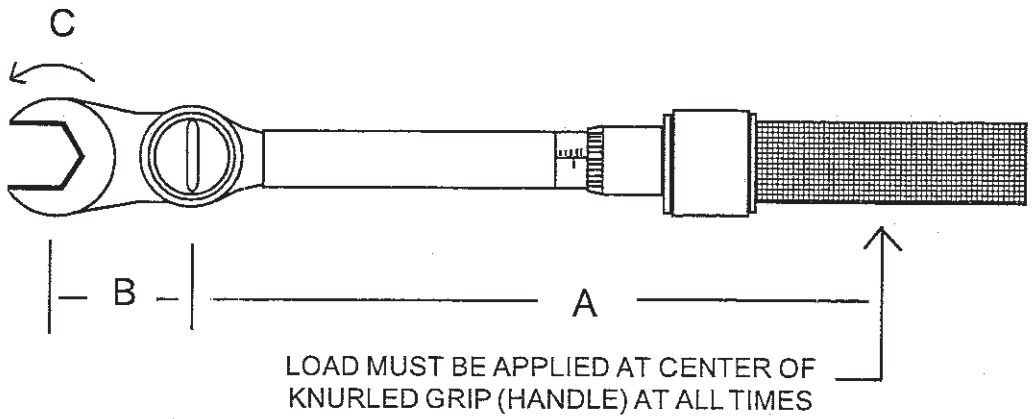

Figure 1 Typical Torque Wrench Shown

If an adapter is attached to the drive of a torque wrench, the wrench will not give actual torque indicated by the setting of the handle. A simple formula however, allows you to figure out what the setting should be to deliver a predetermined amount of torque at the end of any adapter to the fastener.

The following letters are defined as:

A = Length of the torque wrench when set at the middle scale setting (inches).
B = Length of adapter (inches from center hex bolt to center of torque wrench square shaft.
C = Desired torque at end of extrusion
D = Setting for accuracy within + or - 6%.

Here is a typical problem. You have an adapter that adds 10.0 inches to a torque wrench length (dimension B) What should the setting be to obtain 320 ft. lbs. of torque at the end of the adapter.

A = 22.57 inches (length from adapter mounting point torque wrench to center of grip / handle)
B = 10.0 inches (Length from adapter mounting point of torque wrench to center of hex slot).
C = 320 ft. lbs. torque (desired torque at end of extension).
D = Unknown (setting you need to set torque wrench to = 320 ft. lbs for accuracy).

$$C = \frac{(A)}{(A+B)} \text{ or } 320 \frac{(22.57)}{(22.57+10.0)} = 320 \frac{(22.57)}{(32.57)} = 320 \times 222 \text{ ft. lbs.}$$

Your Answer (D) is a setting of 222 ft. lbs. on the torque wrench will give 320 ft. lbs. of torque at the bolt. By using the above formula an accuracy of + or - 6 % of the desired torque will result at the end of the adapter due to length change during grip adjustment.

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HOSE END FITTING TORQUE SPECS:

Hose End Type: 37 Degree Angle End Steel Hose End Fittings*

Dash Size	Nominal Cyl. Size (in.)	Torque in. lbs.	Torque ft .lbs.
-4	1/4"	140	12
-6	3/8"	230	19
-8	1/2"	450	38
-10	5/8"	650	54
-12	3/4"	900	75
-16	1"	1200	100
-20	1-1/4"	1600	133
-24	1-1/2"	2000	167
-32	2"	2800	233

* Straight Threads do not always seal better when higher torques are used. Too much torque causes distortion and may lead to leakage. DO NOT over torque fittings and DO NOT allow any contaminants to enter system through fittings when installing them.

TORQUE VALUES - BOLTS: Recommended Torque, Ft. lbs. & (Nm)

IMPORTANT! Listed below IS BOLT TORQUE and NOT APPLICATION TORQUE, Component Application Torque will vary depending on what is bolted down and the type material (Metal) that is being bolted together. Thread condition and lubrication will vary Torque settings.

Inche Sizes

Bolt Dia. inch	2 (B) Plain Head	5 (D) 3 Dashes	8 (F) 6 Dashes
1/4	Not Used	10 (14)	14 (19)
5/16	Not Used	20 (27)	30 (41)
3/8	Not Used	35 (47)	50 (68)
7/16	35 (47)	55 (75)	80 (108)
1/2	55 (75)	85 (115)	120 (163)
9/16	75 (102)	130 (176)	175 (230)
5/8	105 (142)	170 (230)	240 (325)
3/4	185 (251)	300 (407)	425 (576)
7/8	160 (217)	445 (603)	685 (929)
1	250 (339)	670 (908)	1030 (1396)
1-1/8	330 (447)	910 (1234)	1460 (1979)
1-1/4	480 (651)	1250 (1695)	2060 (2793)

ALWAYS CHECK MARKINGS ON TOP OF BOLT HEAD OR OTHER BOLT DESCRIP-TIONS

Metric Sizes

Bolt Dia. mm	4.8	8.8	10.8
6	5	7	12
8	11	20	25
10	20	40	58
12	37	70	105
14	60	100	140
16	92	155	200
18	118	216	280
20	160	270	355
22	215	330	430
24	285	500	700
27	450	875	1000
30	600	1200	1700
33	800	1600	2300
36	900	2100	3000

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Section 2

Mechanical Repairs & Adjustments

RH & LH Models

IMPORTANT NOTE:
The RH Single Wing and the LH Dual Wing adjust and repair procedures are the same with the exception it will be a mirror image and mounted on the opposite side. Make note which you are working on, the illustrations in this manual are showing mostly the RH Wing.

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INTRODUCTION TO REPAIRS

INTRODUCTION: In Most diagrams there are no Component Part Numbers Listed, Only Item numbers and Descriptions, This is because most parts shown as breakdown in drawings are for location & identification only and if available as replacement parts will be listed in the Parts/Operators Manual. NO Dirt at all should be around Parts during repairs.

BEFORE STARTING REPAIRS: Service Rules (READ THIS)

1. Remove Front Cover. Clean Pump and surrounding area completely before removing any connec tions or Lines. NO DIRT OR DEBRIS CAN BE ALLOWED ON OR NEAR HYDRAULIC SYSTEM IF IT IS BEING WORKED ON, ANY DIRT OR CONTAMINANTS IN SYSTEM NO MATTER HOW SMALL WILL DAMAGE SYSTEM!
2. After cleaning around all connections thoroughly, Disconnect all connections, Lines, Hoses, Wiring and Remove the Pump Completely from the Tractor. Plug all hoses and Lines on Tractor and on Pump, DO NOT leave any open Lines. NO Contamination Should be allowed into system at all.
3. Clean Area, Clean all Tools, Pans etc. The cleaning of Area and Tools MUST be done before moving (Cleaned) Pump there. Drain Oil from Pump, Recheck outside of Pump to Make Sure it is Clean
4. After disassembly of Pump wash all metal components in clean solvent.
5. Use compressed Air to dry parts after washing (Compressed air must be filtered and moisture free). DO NOT wipe them dry with Paper Towels or Cloth as these will leave lint and/or dust contamination. DO NOT USE Compressed Air to spin any component (Such as Bearings or Plates) as this will damage them and could be dangerous.
6. Always use new Seals when reassembling Hydraulic Pumps, Lubricate the new rubber Seals with a Petroleum Jelly, (Vaseline) before installing them.
7. DON'T reinstall worn/damaged Parts in Pump, DO NOT Use a worn/damaged Pump Housing.
8. Torque all Bolts over Gasketed Joints. Then repeat the Torque sequence to make sure Bolts are tight, some times Gaskets can give a Torque reading that is OK but is not, so always recheck Torque.
9. Verifying the accuracy of Pump Repairs on an authorized test stand is essential.

RECOMMENDED TOOLS:

1. Hex Allen Wrench (Qty 5) (9/16", 5/32", 5/16", 3/32", 5/64"
2. Retaining Ring Pliers (Qty 3), 1 each of Internal (Straight .070 tip) internal (Straight .090 tip) & 1 each External (Straight 0.90 tip)
3. Retaining E-Ring Applicator (Qty 2), 1 each 9/32" & 1 each 1/2".
4. O-Ring Pick (Qty 1)
5. End Wrench (Qty 4), 1 each of 7/16", 9/16", 3/4", 1"
6. Torque Wrench (Qty 1), 0 to 100 ft. lbs. (135.6 nm) capacity
7. Hammer, Soft Face (Qty 1)
8. Seal Driver Set (Qty 1)
9. Arbor Press (Qty 1)
10. Sockets (Qty 3) 7/16", 9/16", 3/4" , Drive Size should match Torque Wrench Drive)
11. Light Petroleum Jelly (Vaseline)
12. Locktite, # 222 and #277 or equivalent (Qty 1 tube each)

RECOMMENDED GAUGES FOR DIAGNOSTICS:

1. Inlet Vacuum: 30 PSI to 30 in Mercury (207 bar to 0 bar)
2. System Pressure Gauge: 6,000 PSI (700 bar)
3. Charge Pressure Gauge: 0 to 500 PSI (0 to 25 bar)

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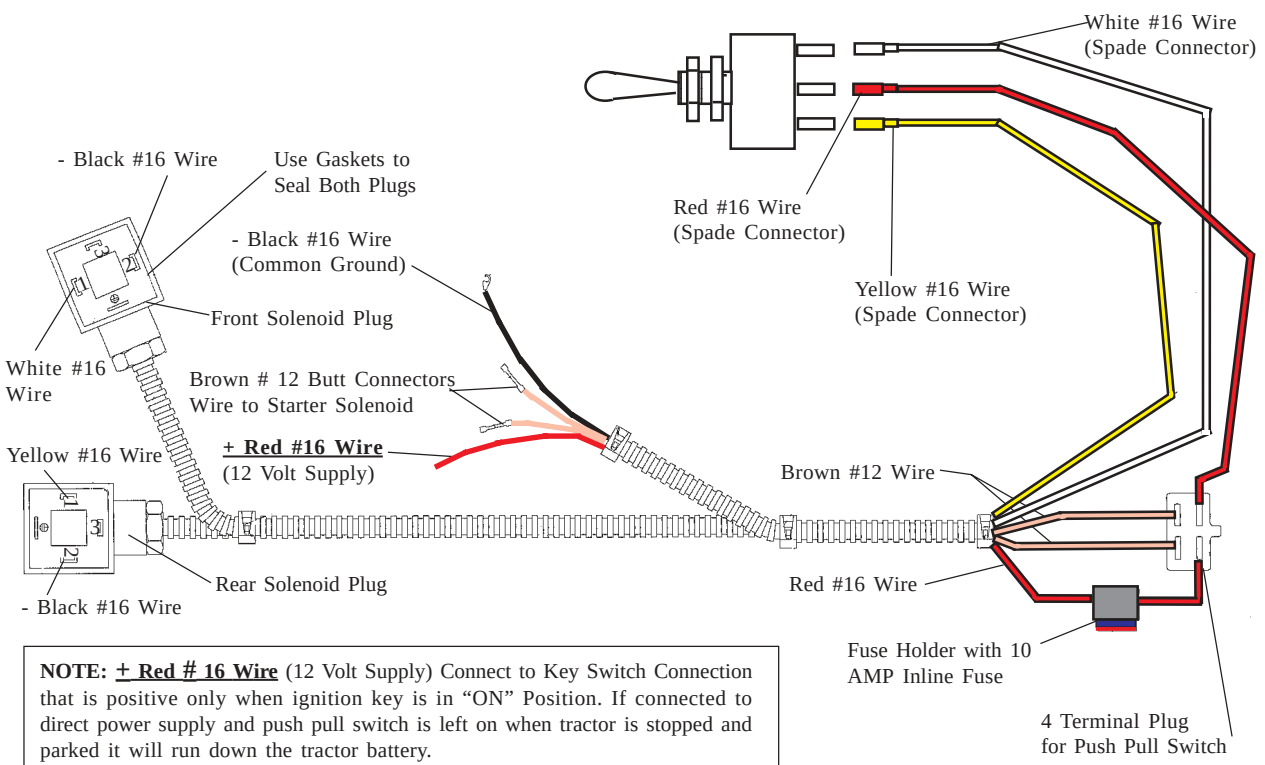
MOTOR - PUMP ELECTRICAL CIRCUIT

Electrical Circuit: RH Wing Mower

The electrical circuit is a pre-assembled wire harness that will control the motor functions. The harness will be used with a push pull off/on switch that prevents the tractor from being started when motor is engaged. The wire harness uses a three position toggle switch that is used to reverse the knife bar direction of travel. These switch are not part of the wire harness assembly, These switches must be connected correctly to operate correctly (See Figure 2). There is a motor control valve mounted on top of the hydraulic tank that will have two electrical solenoids connected to it. The wire harness has two plugs on one end that connects to the solenoids, one plug will have longer wire (also has White Wire) than the other and will connect to the solenoid further most from the cutter bar mount. The other plug with the shorter wire (has Yellow Wire) will connect to the first solenoid closet to the operator. The Starter solenoid wires and the 12 V power supply wire will have to be connected to tractor wiring, The power source wire must be connected to a power source that is only charged when the tractors key switch is in the on position. If power supply wire is connected direct to a power source it will run the tractor battery down.

When connecting wire harness to toggle switch the red wire MUST connect to the center post of switch, the yellow and the white wire must connect to the two outside post, it will not mater which outside post as long as one each of yellow or white wire is connect to the outer post (See Figure 2).



NOTE: + Red # 16 Wire (12 Volt Supply) Connect to Key Switch Connection that is positive only when ignition key is in "ON" Position. If connected to direct power supply and push pull switch is left on when tractor is stopped and parked it will run down the tractor battery.

Push Pull Switch, Wire Harness plug will only fit one way on push pull switch to prevent it being connected wrong.

Figure 2

This Wire Harnes Used for RH Wing

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MOTOR - PUMP ELECTRICAL CIRCUIT

Electrical Circuit: Dual LH Wing Mower

The electrical circuit for LH Wing is a pre-assembled harness that controls the motor & cylinder functions. The harness is used with a off/on switch that allows RH mower or LH mower to be run as decided by the operator but not both at same time. The wire harness for the LH mower will be used with the wire harness for the RH mower. The wire harness is connected to Diverter Valves that are connected into the hydraulic lines to select the oil flow from one mower or the other. The solenoid valve on the tank will still be used to reverse the flow of oil changing rotation direction on cutter bar. The wire harness has two plugs on one end that connects to the Selector Valves. The Plugs on the harness will connect to the diverter valve solenoids, both these solenoids will be open at the same time or closed at the same time. If the cutter bar on one mower runs and the cylinder on the other side operate the hoses are not connected correctly (See Hydraulic Diagram for Dual LH Wing). The12V power supply wire will have to be connected to tractor wiring, The power source wire must be connected to a power source that is only charged when the tractors key switch is in the on position. If power supply wire is connected direct to a power source it will run the tractor battery down when parked if the switch are left on as the solenoid could be activated (See Figure 2A)

When mounting the two position toggle switch you will need to drill a 1/2" hole in the valve mount on the RH side of it near the bottom (See Figure 2C). Install the toggle switch with the "On" position up. There is a decal that mounts on valve mount that will explain the operation of the RH or LH selector toggle switch.

The wire harness for the LH diverter valves will only have two wires connected to the plug, these two wires are #16 GA Red (+) and # 16 GA black (-). These wire are connected together in the two plugs (The red & red and the black & black), with the fuse removed to prevent current flow the plugs can be checked with an Ohm Meter from plug to plug and plug (Red Wires) to toggle switch. The black wires are connected to a common ground and can be tested to a ground source (See Figure 2B).

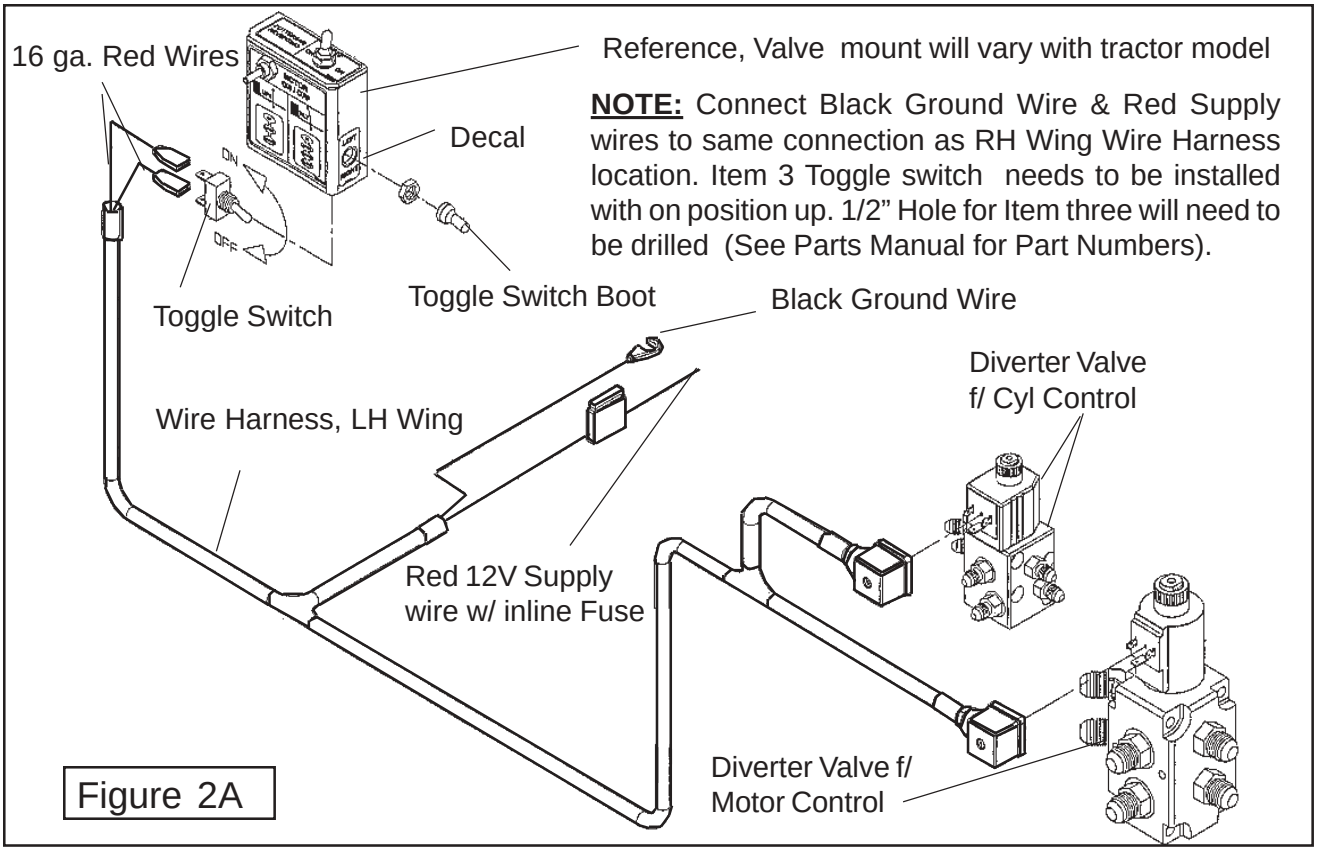
16 ga. Red Wires
Reference, Valve mount will vary with tractor model
Decal
ON
OFF
NOTE: Connect Black Ground Wire & Red Supply wires to same connection as RH Wing Wire Harness location. Item 3 Toggle switch needs to be installed with on position up. 1/2" Hole for Item three will need to be drilled (See Parts Manual for Part Numbers).
Toggle Switch
Toggle Switch Boot
Black Ground Wire
Diverter Valve f/ Cyl Control
Wire Harness, LH Wing
Red 12V Supply wire w/ inline Fuse
Diverter Valve f/ Motor Control

Figure 2A

Switch Blade 5' & 6' (Service Manual) 02/05

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MOTOR - PUMP ELECTRICAL CIRCUIT

Electrical Circuit: Dual LH Wing Mower (Continued)

IMPORTANT: All Toggle Switches and push pull switches must be installed before the two spool control valve is mounted as once the valve and hoses are installed they are difficult to get to. If switches must be repaired or removed, the removeal of the control valve may be required. The hose should not require disconnecting only the valve. Lay the valve with hoses to one side to get to the switches.

The componets used when a dual LH Wing is installed will not replace the components used in the mounting of the RH Wing, they will be used with the RH components. The stand for the valve mount and the valve mount can vary with the type/ model tractors be used. Shown here is a stand and mount typical of what is used onROPS tractor without cab (See Figure 2D). If mounting on cab tractor the controls will be worked through remote cables and this type mount will not be used. The Toggle switches and push pull switch will be mount onto brackets witch connect to control cable stand / mount, the toggle switch connections will be the same for wiring. Onlt the mounting of the switch itself will be different.

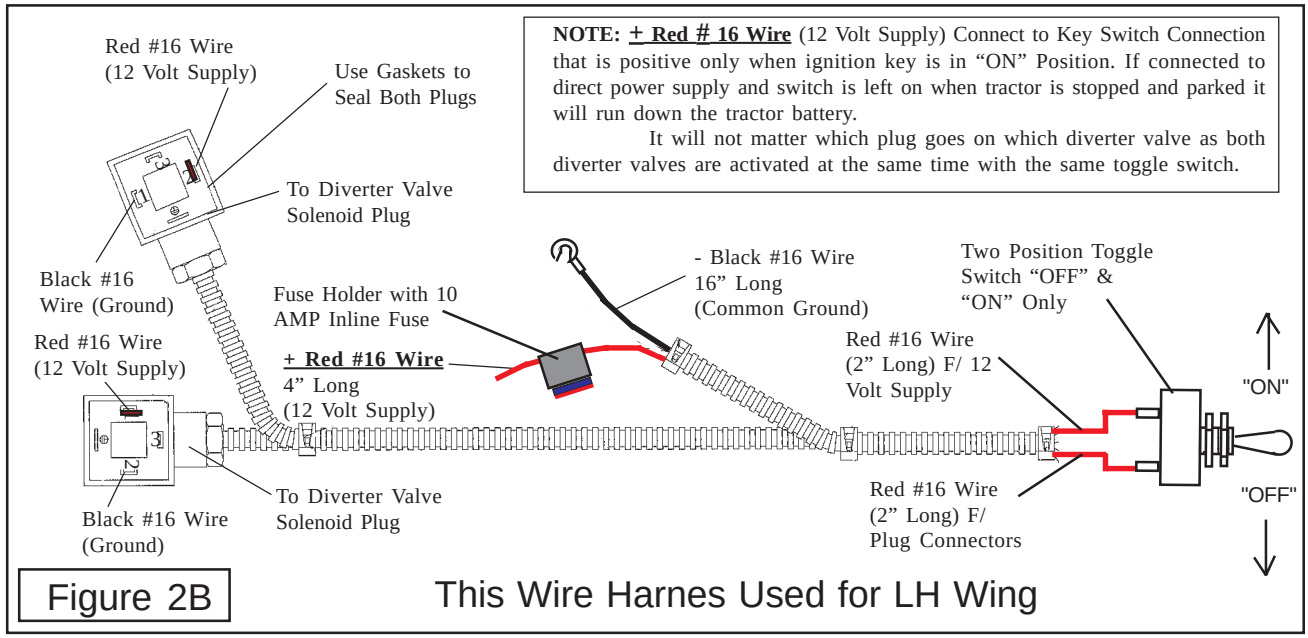
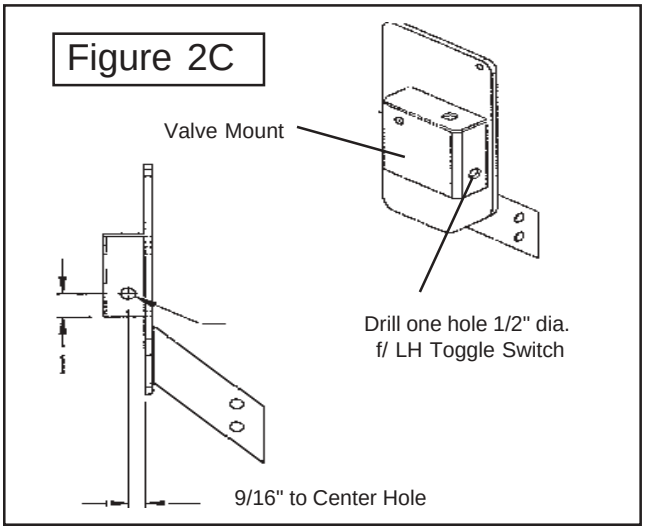
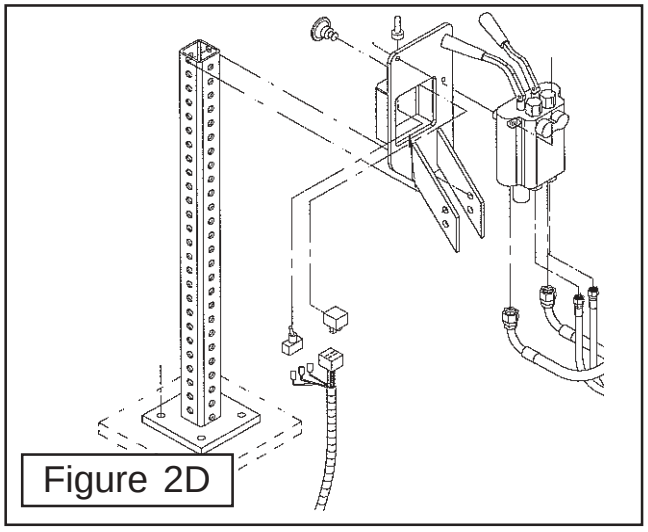

NOTE: + Red # 16 Wire (12 Volt Supply) Connect to Key Switch Connection that is positive only when ignition key is in "ON" Position. If connected to direct power supply and switch is left on when tractor is stopped and parked it will run down the tractor battery.
It will not matter which plug goes on which diverter valve as both diverter valves are activated at the same time with the same toggle switch.
Red #16 Wire (12 Volt Supply)
Use Gaskets to Seal Both Plugs
To Diverter Valve Solenoid Plug
Black #16 Wire (Ground)
Fuse Holder with 10 AMP Inline Fuse
- Black #16 Wire 16" Long (Common Ground)
Two Position Toggle Switch "OFF" & "ON" Only
Red #16 Wire (12 Volt Supply)
+ Red #16 Wire 4" Long (12 Volt Supply)
Red #16 Wire (2" Long) F/ 12 Volt Supply
"ON"
"OFF"
To Diverter Valve Solenoid Plug
Black #16 Wire (Ground)
Red #16 Wire (2" Long) F/ Plug Connectors

Figure 2B

This Wire Harnes Used for LH Wing





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MOTOR - PUMP ELECTRICAL CIRCUIT

Motor & Cylinder Diverter Valve Solenoids: Used w/Dual LH Wing

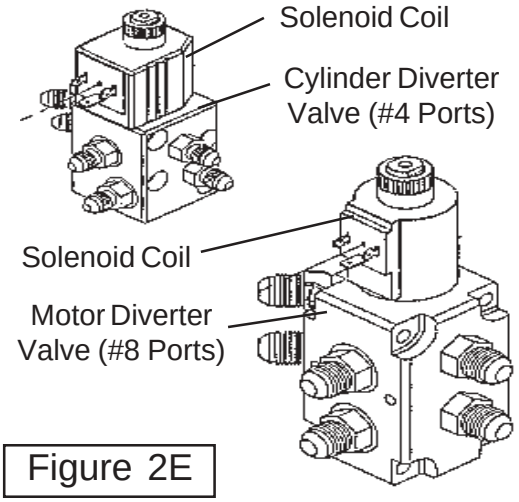


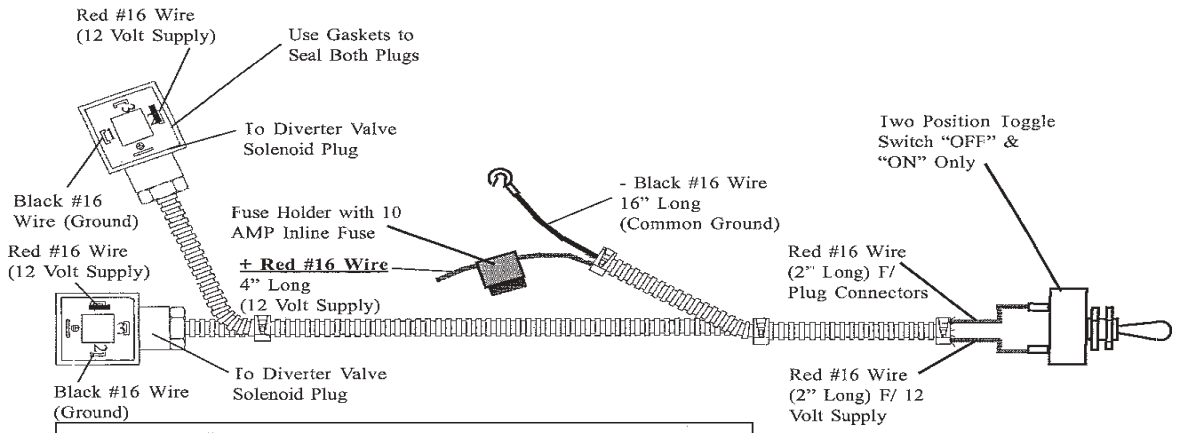
Figure 2E

This Only applies if unit has a LH dual Wing, RH Wing Only models DO NOT use diverter valves. The diverter valve is a solenoid operated electrical activated directional valve. It is designed to send the oil flow to one wing or the other, NOT to both at the same time. The flow of oil pressure to the motor and cylinders is controled by the operator, he can run one wing at a time. The Solenoids can be removed and / or changed without removing the diverter valve or the valve connections. There is a nut on the end of the solenoid that when removed will allow the coil and tube assembly to be removed. The solenoid can be replaced as an assembly or by parts. The wire harness plugs will have to be disconnected from the coils. There are no adjustments to the solenoid or valve (See Figure 98).

To test the solenoid this can be done with a test light or a volt meter. Test the wire harness first to make sure that the connections are good and there is current present. REMEMBER the solenoids are connected to the toggle switch which means both diverter valve solenoid are energized at once, and this is determined by the toggle switch. If you check one solenoid and it has current then check the other solenoid at the plug.

The coil can be tested by using a small paper clip. Remove the solenoid coil retaining nut. Energize the coil and stick the small paper clip to the end of the stem sticking out of the coil. The paper clip should stick to the stem magnetically and fall off when the coil power is shut off. Note: use a small paper clip or small wire as the magnetic pull of coil is very low and will not carry a heavy weight. The coil is working properly if it held the paper clip.

If all the test show to be OK, check the stem that screws into the valve body, The best way to check this is to try a different one, the other one on the other side of valve can be switched or a new one can be tried. When removing the stem inspect it when you get it out to see if there is something stuck in it.


Red #16 Wire (12 Volt Supply)
Use Gaskets to Seal Both Plugs
To Diverter Valve Solenoid Plug
Black #16 Wire (Ground)
Fuse Holder with 10 AMP Inline Fuse
± Red #16 Wire 4" Long (12 Volt Supply)
- Black #16 Wire 16" Long (Common Ground)
Two Position Toggle Switch "OFF" & "ON" Only
Red #16 Wire (12 Volt Supply)
Red #16 Wire (2" Long) F/ Plug Connectors
To Diverter Valve Solenoid Plug
Black #16 Wire (Ground)
Red #16 Wire (2" Long) F/ 12 Volt Supply

NOTE: ± Red # 16 Wire (12 Volt Supply) Connect to Key Switch Connection that is positive only when ignition key is in "ON" Position If connected to direct power supply and push pull switch is left on when tractor is stopped and parked it will run down the tractor battery

It will not matter which plug goes on which diverter valve as both diverter valves are activated at the same time with the same toggle switch.

Figure 2F

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CUTTER BAR ADJUSTMENTS

Lead Adjustment:

The lead angle is how far the outer end of the cutter bar runs forward of the inner end.

The lead angle of the cutter bar is preset at the factory at 3/6" per foot. The lead may be changed if desired. To reduce the lead, move the washers from the outside of the cutterbar support plate in between the rubber strike pad and plate (See Figure 3).

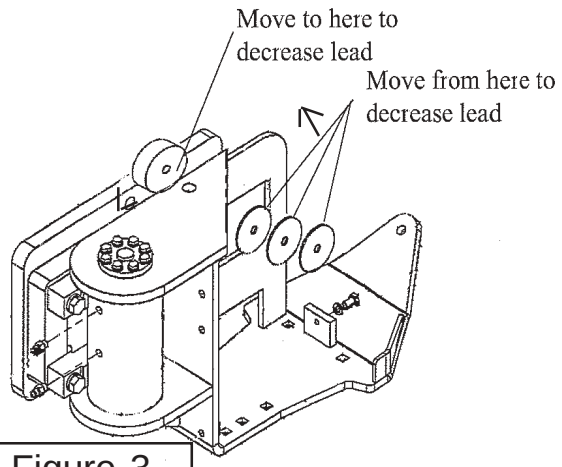

Figure 3

Pitch Adjustment:

The Pitch angle is the level of the cutter bar front to rear or what angle the blade is to level front to rear. Different cutting conditions allow you to change the pitch of the knife by + 15° to - 15° or level.

The pitch is set by loosening the three mounting bolts that connects the skid shoe / Break-A--Way assembly to the carriage arm assembly (See Figure 4 & 4A). The two lower bolts holes are slotted, this will allow the cutter bat to be tipped up +15° or down -15° in front. Set Pitch at what works best for your application.

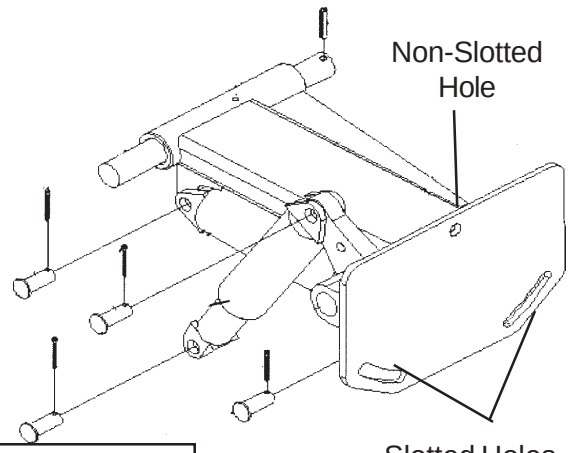

Figure 4

Cutter Bar Alignment:

All cutting is done by the knife passing over ledger plate in the guard. It is vital that these sections are parallel with the plates and in contact with them, (See Figure 5 & 6).

The knife should move smoothly in the cutterbar guides and every knife section should rest on the ledger plate to make a shear cut. This means the guards, ledger plate, wear plates, clip and knife head caps must be in good condition and correctly set. If these parts become loose or worn, the knife will flop around in the cutter bar, chewing and tearing instead of cutting.

Figure 4A

Guard Adjustment:

1. To align the guards, the only method provided to accomplish this very important adjustment is to bend the guards into alignment with a hammer. No easier method has been found to adjust heavy duty guards which will stand up in rocky conditions.

Continued Next Page

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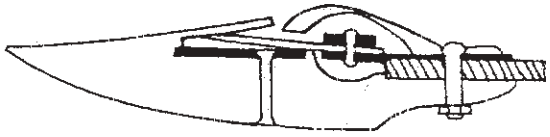
CUTTER BAR ADJUSTMENTS

Note: Guards are cast from alloy steel. If they are worked to much, they will harden and cannot be bent. In this case remove the guard from the bar and remove the ledger plate. Heat the guard to a cherry red and cool. This process will anneal the guard enough that it can be bent.



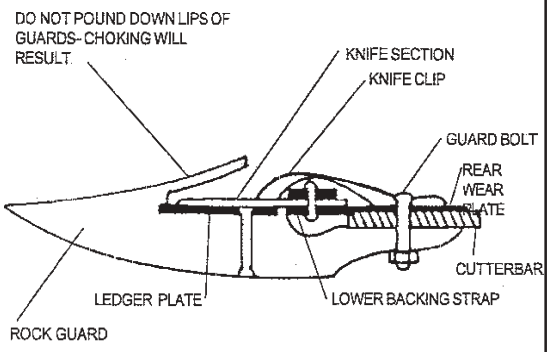
WRONG

Figure 5

2. Raise the bar to about 45°. Make certain the knife is at the full retracted position of the stroke so the flywheel doesn't suddenly turn and catch your fingers in the knife. A pair of Vise Grip Pliers gripped tightly to the knife on the upper side of the rock guard will allow extra protection against cutter bar from turning. Make certain the Tractor is secured so it cannot be started until you are the one who decides to start it when the job is finished, all tools removed and cleaned up and it is safe to do so. Make certain tractor parking brake is set.

3. Sight down the bar and look for a knife section in close contact with a guard ledger. If the section to the right and left are both 1/8" of the ledger do not bend the two sides up until they contact the knife. This is wrong (see Figure 5), the high guard should be knocked down until all three contact. The higher up a guard gets bent, the more the knife section will tend to contact only the tip (See Figure 5 & 6).

4. Bolt the guards tight and strike them in the thick part, just in front of the ledger plates (see Figure 6). Do not pound down the guard lips as the knife might bind. Retighten the bolts as each guard is aligned. Disregard the position of the guard points. It is the ledger plate which must be kept in line. Blunt points should be filed sharp.



RIGHT

Figure 6

5. Start from the inner shoe, adjust each guard so that the knife section and ledger are parallel and reasonably close to each other. Find the high guard and knock them down. Usually, the only time it is necessary to knock a guard up is when new guards are first installed on the bar.

6. Make certain that the first knife section is contacting the inner shoe ledger plate. If it doesn't contact, check the first or second guard which may be holding the knife up or the inner shoe ledger plate may be worn out.

7. Finally, align the industrial outer shoe in the same way as the guards. (See Figure 5 & 6 and step 1 through 6)

Wear Plates::

The wear plates must line up with each other to give the knife back straight bearing along its entire length. Wear plates should project approximately 1/16" in front of the leading edge of the cutterbar after adjustment. Alamo Industrial wear plates are hardened on both edges. After the first edge has worn back, simply turn over the plate to obtain a new wearing surface.

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CUTTER BAR ADJUSTMENTS

Clips:

After all guards are adjusted, it is necessary to see that the knife clips are bent down to within 1/64" of the section. The easiest way to check this is to hold the knife down on the ledger plate and use a feeler gauge or the cover of a paper match book to measure the clearance. Do not attempt to hold the tightly against the ledger plate with the clips. Knock the clips down with a hammer. A light blow with hammer is all that is required. If the clips drag on the knife, pry them up. Drag will bind the knife and wear the clip very rapidly (See Figure 7 & 8).

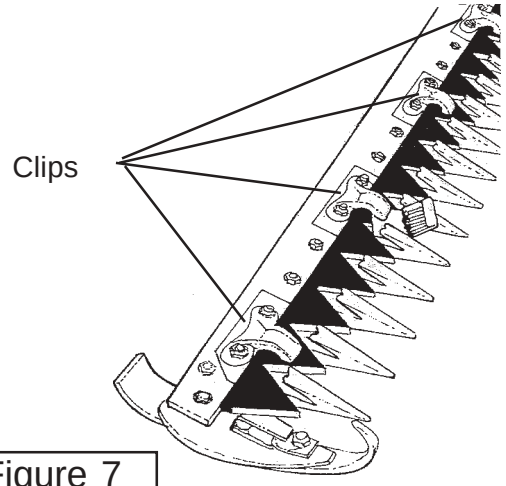

Figure 7

Knife Repair:

ALWAYS USE A SHARP KNIFE. A dull knife cuts poorly, may plug and doesn't do a clean job. Keep the knife straight with the sections firmly riveted to the knife back. When sharpening knife, be careful to restore the original shear angle and bevel of 23 °. Properly and improperly ground knife sections are shown (See Figure 9). A knife section that has been ground several times may have the proper angle and bevel and still be unserviceable because the hard cutting edge has been ground away and the section is to short to cut everything encountered.

Knife Replacement:

Replace worn or broken knife sections. Alamo Industrial knife sections are heavy duty sections made of special steel and will stay sharp for many more hours than conventional sections.

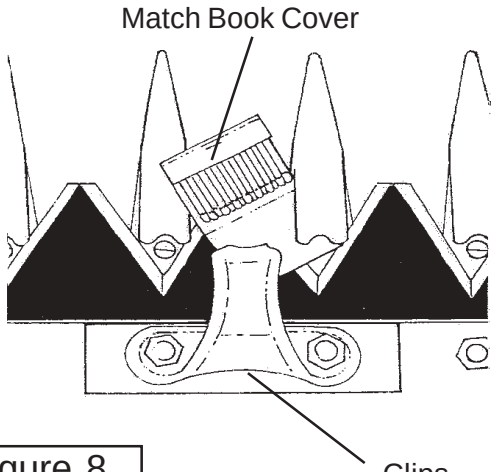

Figure 8

New Sections - proper bevel and angle for good work.

Improperly ground sections - narrow bevel and wrong angle which changes the angle of shear.

properly ground sections even after repeated griding, proper bevel and angle are retained.

Sections ground off center, destroying the register of blade in guard.

Figure 9

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CUTTER BAR REPLACEMENT

Cutter Bar Assembly Replacement:

Replacement of the complete cutter bar assembly will require the cutter bar assembly to be unbolted from skid shoe / break-a-way assembly. Wear gloves as the knives on the cutter bar can be very sharp and can cut you. (See Figure 10)

It will not be require to remove any of the hydraulic hoses or even take them loose. Looking down at the planetary drive (and Hydraulic Motor Assembly) there are four nuts in the plate that is attached to the drive assembly. Remove these four nuts, if you want to remove the four carriage bolts the skid shoe will have to be unbolted and removed. When lifting the drive assembly up and away from the cutter bar take notice of the four tube spacers under the drive assembly, there are two different length of the spacers. The short ones go to the rear and the long ones go to the front. Once the drive assembly has been lifted off you will see a nylon bearing in the knife bar head clamp, it should have stayed in the clamp.

There will be two more bolts connecting cutter bar to break-a-way assembly once these nuts are removed the cutter bar should lift up over the bolts if they were left in. There will be a square plate under the cutter bar that has 4 holes in it, make certain to note this for reassembly

When reinstalling cutter bar reverse the disassembly procedures. Make certain the nylon bearing is in good condition or replaced, sometimes the clamp will have to be loosened to get the nylon bushing installed into clamp and the drive stud that is attached to the drive assembly with two socket head bolts, DO NOT tighten clamp bolt now. This drive stud can be unbolted from drive assembly, inserted into nylon bearing and re-bolted to drive assembly later.

The nuts on the carriage bolts (4 short and 2 long 3/4" carriage bolts) that retain the drive assembly and the cutter bar to the break-a-way assembly must be torqued to 85 ft. lbs.

After the assembly is finished the guards, clips and ledger must be checked, see the previous section in this manual for setting cutter bar components.

Tighten the clamp bolt around the drive stud, use a good thread lock compound on clamp bolt and tighten the clamp bolt until the up & and down movement of clamp on drive stud is removed. DO OVER TIGHTEN the clamp bolt as the drive stud has a bearing inside that will be damaged.

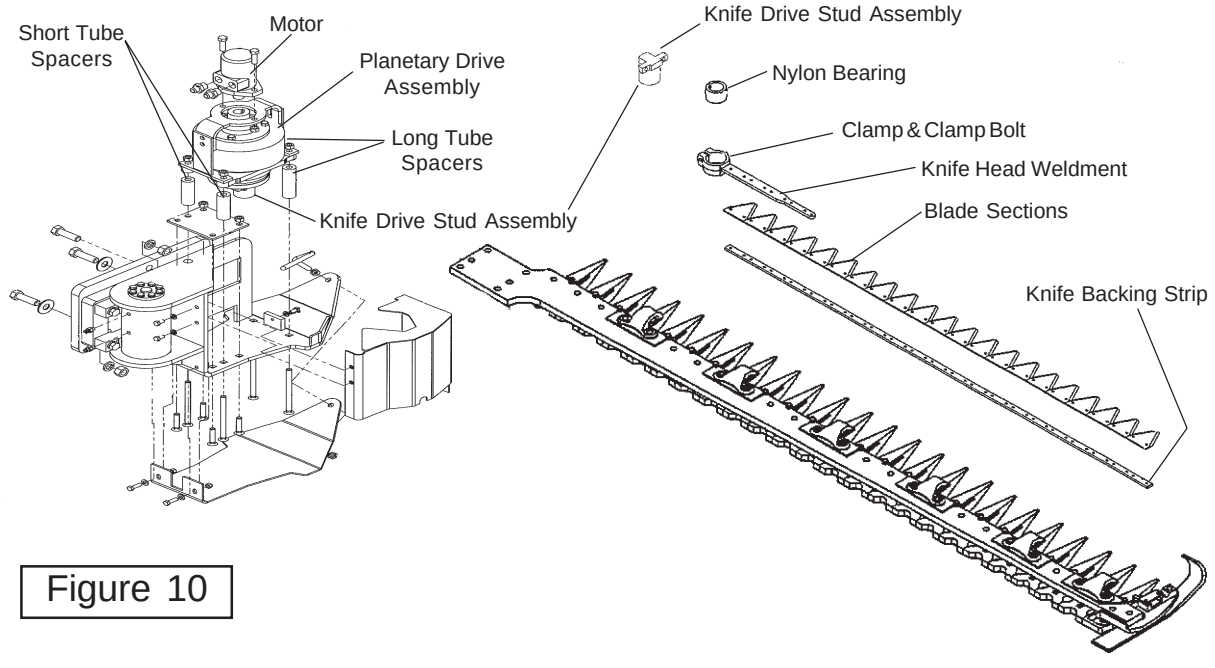

Figure 10

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KNIFE BAR REPLACEMENT

Knife Bar Replacement:

Replace the Knife Bar assembly will require the cutter bar assembly to be unbolted from skid shoe / break-a-way assembly. Wear gloves as the knives on the cutter bar can be very sharp and can cut you. (See Figure 10 & 11)

It will not be require to remove any of the hydraulic hoses or even take them loose. Looking down at the planetary drive (and Hydraulic Pump Assembly) there are four nuts in the plate that is attached to the drive assembly. Remove these four nuts, if you want to remove the four carriage bolts the skid shoe will have to unbolted and removed. When lifting the drive assembly up and away from the cutter bar take notice of the four tube spacers under the drive assembly, there are two different length of the spacers. The short ones go to the rear and the long ones go to the front. Once the drive assembly has been lifted off you will see a nylon bearing in the knife bar head clamp, it should have stayed in the clamp.

There will be two more bolts connecting cutter bar to break-a-way assembly once these nuts are removed the cutter bar should lift up over the bolts if they were left in. There will be a square plate under the cutter bar that has 6 holes in it, make certain to note this for reassembly.

Use caution the knife bar can be very sharp, it is recommended that you wear gloves to protect your hands. The Knife Bar will slide out at the drive end, if it will not slide out then something is wrong. Check the rock guards, clips and other components to see where it is to tight. The easiest way if any of these make it to tight is to unbolt them and remove them for now. The new or repaired knife bar will install the same way, it will slide in from the drive end under clips and between rock guards. DO NOT use hammer or force to install knife bar, if it will not slide in find out why because if the bar is forced in it will be damaged or other component will be damages. The Knife bar and cutter bar can not operate fitting tightly together they will bind causing damage..

When reinstalling cutter bar reverse the disassembly procedures. Make certain the nylon bearing is in good condition or replaced, sometimes the clamp will have to be loosened to get the nylon bushing installed into clamp and the drive stud that is attached to the drive assembly with two socket head bolts, DO NOT tighten the clamp bolt at this time. This drive stud can be unbolted from drive assembly, inserted into nylon bearing and re-bolted to drive assembly later (See Figure 10 & 11). if the drive stud is removed from the drive assembly when you reinstall it the two socket head bolts will need to be torqued to 35 ft. lbs.

The nuts on the carriage bolts (4 short and 2 long 3/4" carriage bolts) that retain the drive assembly and the cutter bar to the break-a-way assembly must be torqued to 85 ft. lbs.

Tighten the clamp bolt around the drive stud, use a good thread lock compound on clamp bolt and tighten the clamp bolt until the up & and down movement of clamp on drive stud is removed. DO OVER TIGHTEN the clamp bolt as the drive stud has a bearing inside that will be damaged.

After the assembly is finished the guards, clips and ledger must be checked for clearance, see the previous section in this manual for setting knife bar to cutter bar components (See Figure 10 & 11).

The skid shoe will be the last item reinstalled. Make certain the rod deflector which bolts to the front of the skid shoe is pointed correctly.

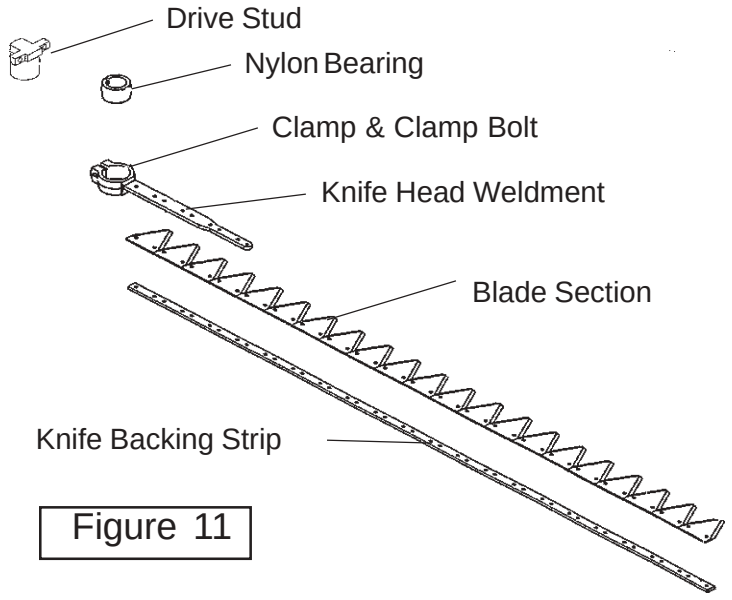

Figure 11

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KNIFE REPLACEMENT

Knife Replacement:

The Knives are very sharp, use gloves and caution when working with these knives. Secure tractor so that it cannot be started until you are ready for it to. Set the parking brake on the tractor. Make certain cutter bar is completely on the down stroke, this will prevent the cutter bar from moving down ward. Also the Knives can be locked with a clamp so it cannot move unless you want it to. If cutter bar needs to move the best way is by using a punch in one of the holes on the flywheel, remove clamp the replace it after you have moved the cutterbar.

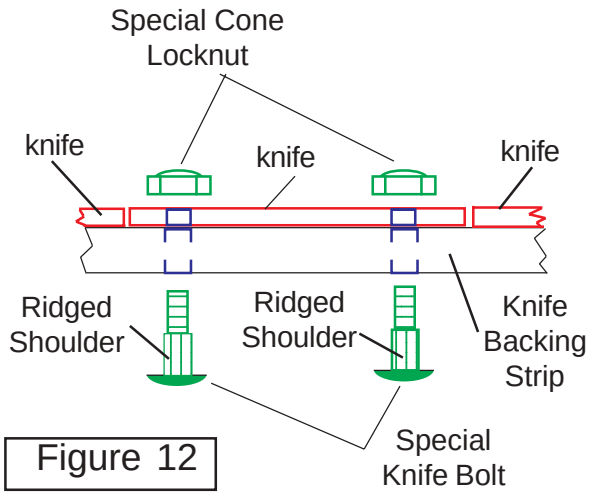

Figure 12

To remove the old knife the Knife retaining bolt will have to be removed, usually these bolts cannot be used again and it is recommended that new one be used when changing knives. When lock nut is removed the bolt should not fall out as the shoulder of the bolted is ridged to make a drive in fit. Drive the bolt out from the top, there are two bolts per knife. There are two different length of these bolts, the majority is 5/8" long. The first 7 bolts which also bolt the knife section, knife backing strip and the knife head weldment together is longer, 1-1/64" long. Remove the locknut, if the lock nut cannot be removed these bolts can be cut with a chisel under the lock nut and the bolt driven out from the top, use caution and not drive a punch or anything through the hole that is larger than the bolt as it will damage the hole in the knife backing plate.

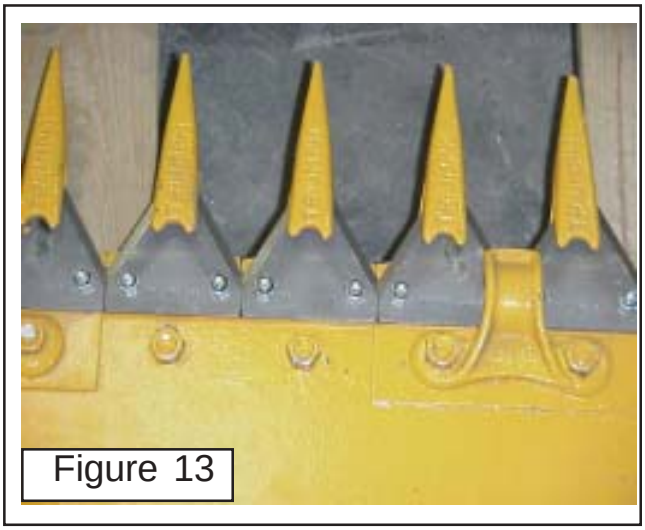
Figure 13

Replace a Knife or a group of knives. The knife can be changed without disassembly of the cutter bar. The Knife retaining bolt is a special ridged shouldered bolt, this makes the bolt have a wedged fit into the knife backing strip. The special bolt will need to be driven into the knife backing strip from the bottom until the head of bolt bottoms out on the knife backing strip. Install the new cone locknut and snugly secure the bolt, do not over tighten these bolts as they are 1/4" gr. 5 and will twist off. Torque 9 to 10 ft. lbs max. If all the rock guards and clips were adjusted right to begin with they should not have changed, but check them for alignment to make certain. If the rock guards and clips need to be adjusted go back to the guard ajustment section earlier in the manual. (See Figure 11, 12, 13 & 14)

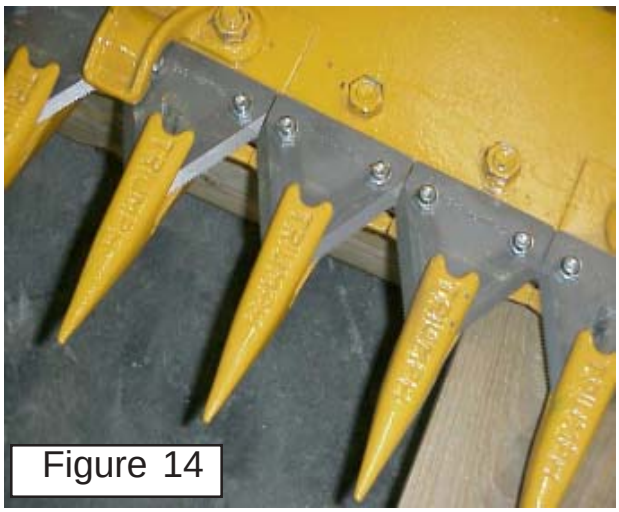
Figure 14

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OUTER SHOE ASSEMBLY REPLACEMENT

Outer Shoe Assembly Replacement:

The outer shoe assembly bolts to the last two holes in the cutterbar. There are two different length bolts used here because the last bolt will also mount the outer shoe sole to the outer shoe assembly. These are 7/16" grade 5 carriage bolts and will torque 45 to 50 ft. lbs. The outer shoe sole is a replaceable wear item and be replaced as needed without disassembly of the cutterbar (See Figure 15 & 16).

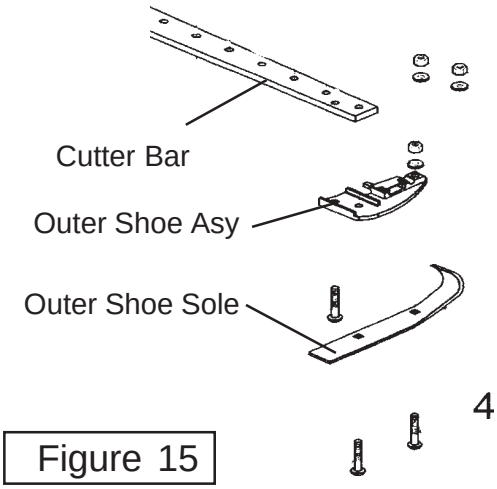

Figure 15

Inner Shoe Replacement:

The inner shoe bolts to the Break-a-way assembly using two bolts in the rear and the rod deflector in the front. There is also a motor cover weldment that bolts over the motor and drive assembly that is bolted on with three bolts (See Figure 17 & 18).

Rock Guard, Clip & Wear Plate Replacement:

The rock guards, clip and wearplates can be replaced without removing that cutterbar or knife bar assembly. They are bolt on items that can be bolted one at a time for repair or they can all be replaced all at the same time. Anytime the guards, clips or wearplates are replaced they will have to be checked to make certain they are fitting correctly. See the guard, clip and wearplate adjustment section on previous pages. The bolts mounting rock guards are 7/16" grade 5 plow bolts and will torque 45 to 50 ft. lbs (See Figure 16)

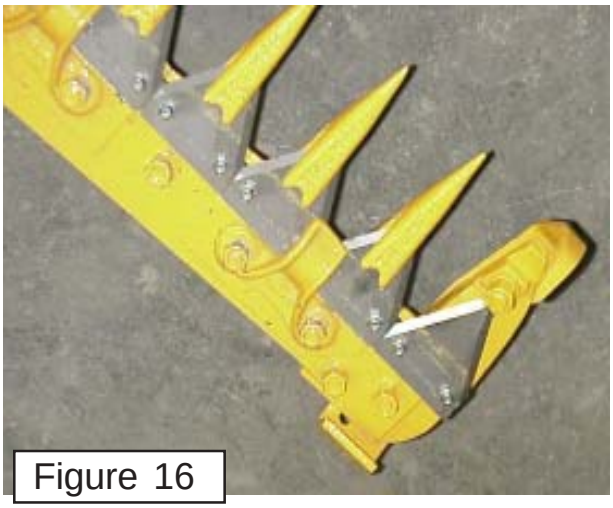
Figure 16

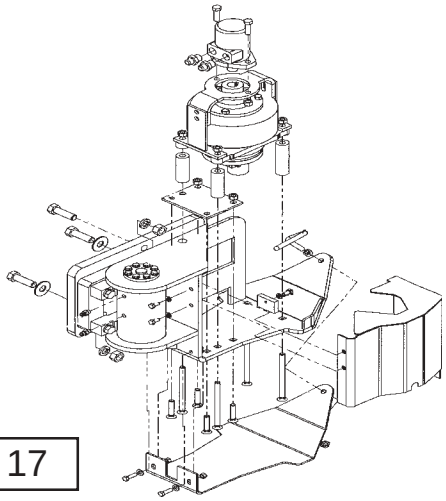
Figure 17

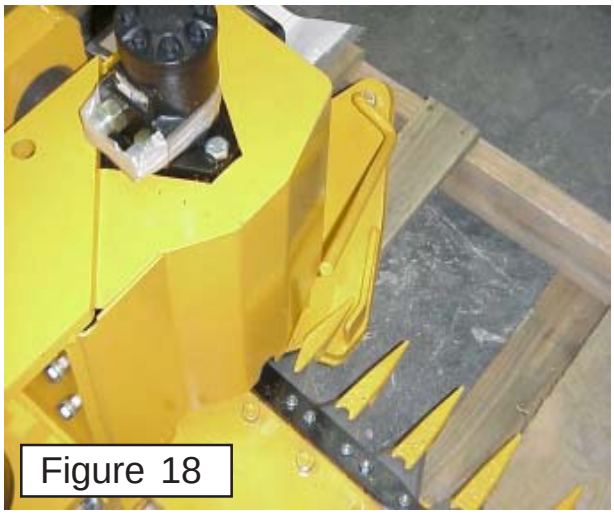
Figure 18

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INNER SHOE WELDMENT REPLACEMENT

Inner Shoe Weldment Replacement:

The Inner Shoe Weldment replacement will require other components to be removed in order to replace the weldment. Removal or disconnection of hydraulic line will not be required. DO NOT Start tractor after this repair has began, secure tractor from starting and set parking brake on tractor.

1. Inner Skid Shoe Plate will have to be removed, See inner shoe replacement on previous page (See Figure 17 & 18).

2. Drive Assembly will need to be removed, See cutter bar assembly replacement on previous pages (See Figure 10).

3. Cutter Bar Assembly will need to be removed, See cutter bar assembly replacement (See Figure 10).

4. The Rotor Actuator is a hydraulic operated break-a-way unit. Before starting repair put a drain pan under rotor actuator. The hoses at the actuator should be loosen slowly, but NOT Removed to relieve pressure in lines and actuator. Make certain that it is the hose at the actuator and not the control or the relief valve block. After the pressure if any has been relieved the hoses can be retightened. This is important DO NOT try to unbolt Actuator Pin or any other frame component until the hoses have had the pressure relieved. (See Figure 19, 20 & 21)

Figure 19

5. The Skid Shoe weldment can be removed with the Rotor Actuator attached to skid shoe weldment and then removed or it can be left bolted to Back Pivot Plate. The rotor actuator is not part of the skid shoe weldment. To remove the actuator from skid shoe remove the 8 bolts that retain break-a-way rotor actuator pin. The rotor Actuator pin goes all the way through the shoe weldment and can be removed by pushing up on pin from bottom (See Figure 19, 20 & 21) **6.** The Back Plate is retained by 3 bolts which mount it to the Carriage Arm, It is not required to remove the Back Pivot Plate to remove skid show weldment. It must removed, remove the three retaining bolts to drop the back plate.

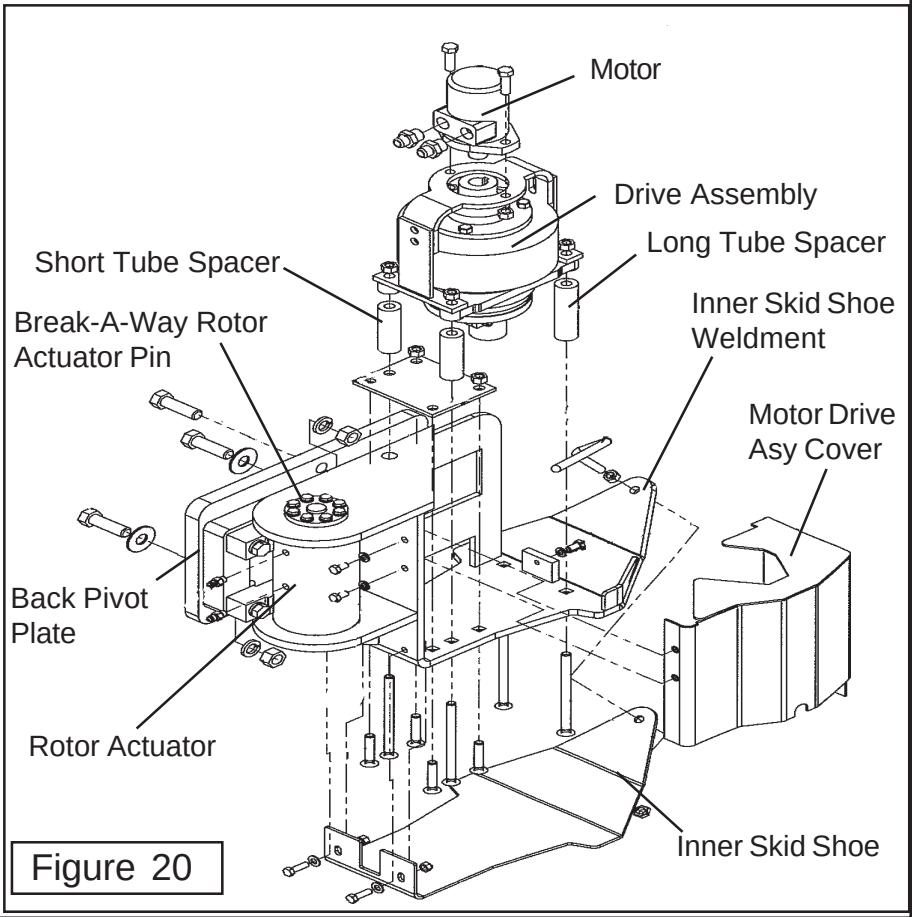

Figure 20

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INNER SHOE WELDMENT REPLACEMENT

6. If the Back Plate has been removed from the carriage arm, it will have to be reset after the reassembly is done. See the Pitch adjustment in previous instruction (See Figure 4). The adjustment to the cutter bar should be check and reset if required after reassembly.

7. Before beginning the reassembly read this section as well as the section that pertains to the component listed below. This is important that these components be assembled correctly as well as adjusted properly. The assembly of the skid shoe weldment, replacement of the Rotor Actuator, Drive Assembly, Cutter Bar, Skid Shoe and Drive Assembly Cover will be reinstalled by reversing the disassembly instructions. (See Figure 10 thru 21)

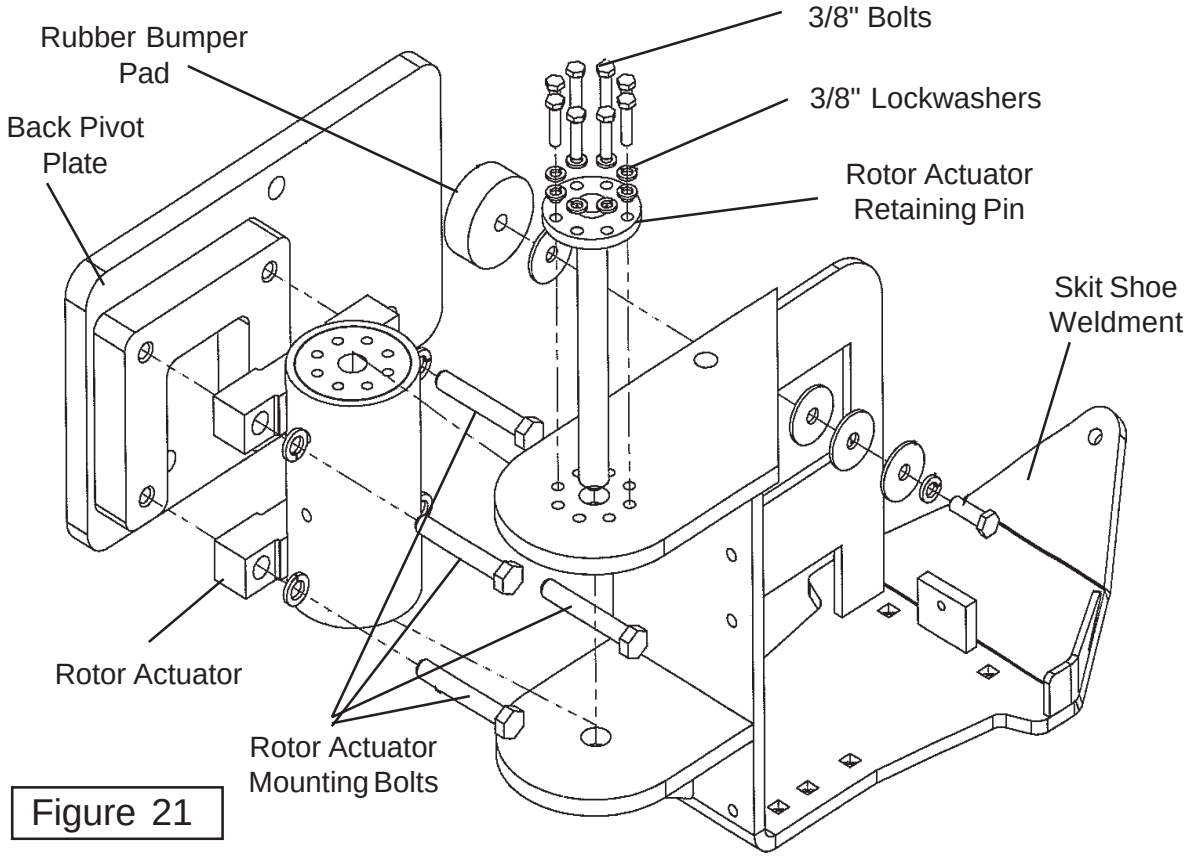

Figure 21

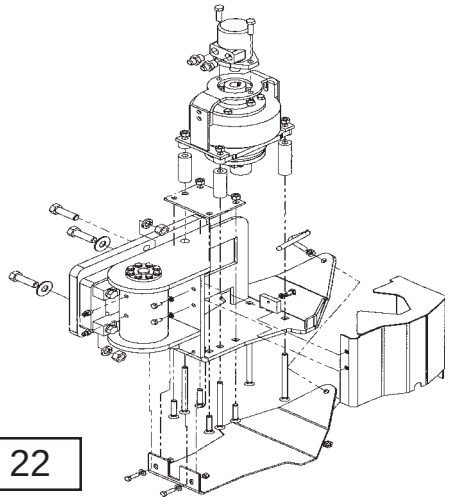

Figure 22

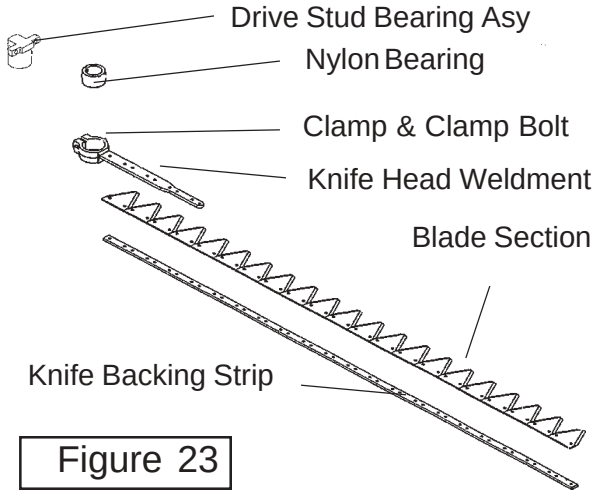

Figure 23

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CARRIAGE ARM ASSEMBLY REPLACEMENT

Carriage Arm Assembly Replacement:

The carriage arm replacement will require the Back Pivot Plate to be unbolted with the skid shoe / break-a-way assembly to be removed with Back Pivot but not disassembled. The skid shoe / break-a-way assembly can be removed by unbolting the back pivot plate from the carriage arm (See Figure 17 thru 25). The hydraulic hoses to the motor will not have to be disconnected but the hose brackets may have to be disconnected to allow the assembly to be moved outward far enough to clear carriage arm assembly. If the complete cutterbar / break-a-way assembly needs to be moved it is sometimes easier and cleaner to unbolt the motor and the complete assembly can be removed an the motor can be moved out of the way with the hoses attached to it. DO NOT pull assembly with the hoses attached and damage them.

To remove the carriage arm the lift and tilt cylinder will need to be disconnected, the hoses will not require disconnecting, the cylinders can be set aside with the hoses connected. Remove the roll pins from the carriage pin. The carriage arm is pinned to the back pivot plate and the tractor mainframe. The mounting frame to attach to the tractor will vary from tractor model, but the way the carriage arm is pinned to will not. Drive the carriage pins out and carriage arm will lift out (See Figure 24, 25 & 26).

To reassemble the carriage arm reverse the disassembly instruction, insert carriage arm, insert carriage arm pins, install roll pin in to carriage arm pin. Install the lift and tilt cylinders, make certain hoses connecting to the cylinders is not twisted or routed wrong as they could be damaged. Attach the back pivot plate with the carriage pin. Bolt the cutterbar / skid shoe assembly to the back pivot plate, note the two lower holes in back pivot plate are slotted on a curve. Flatwashers will have to be used on these two lower bolts (See Figure 25). The pitch of the cutter bar will have to be readjusted, see pitch adjustment instructions in earlier pages (See Figure 4 & 26)

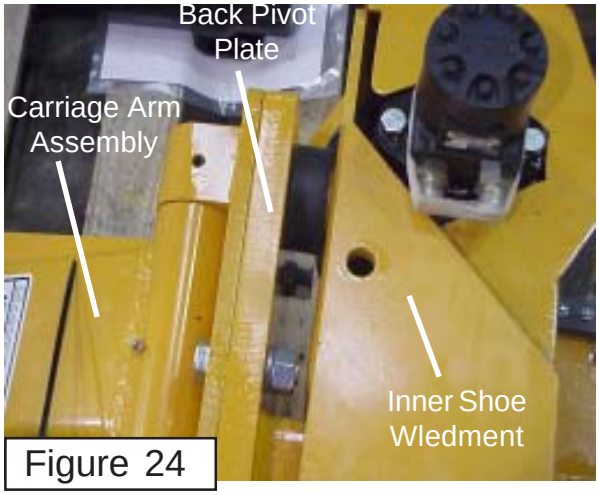

Figure 24

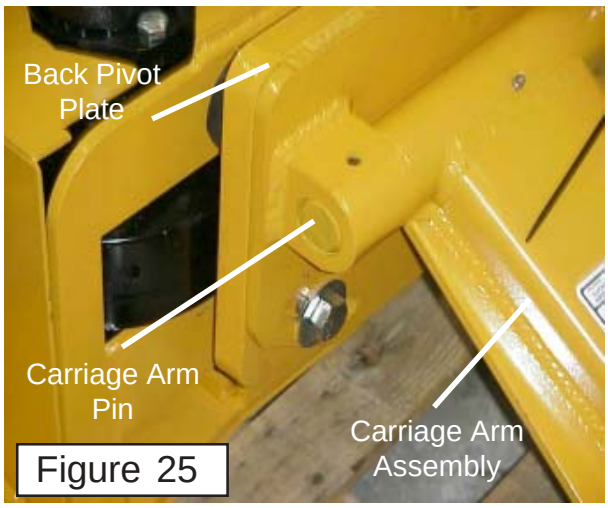

Figure 25

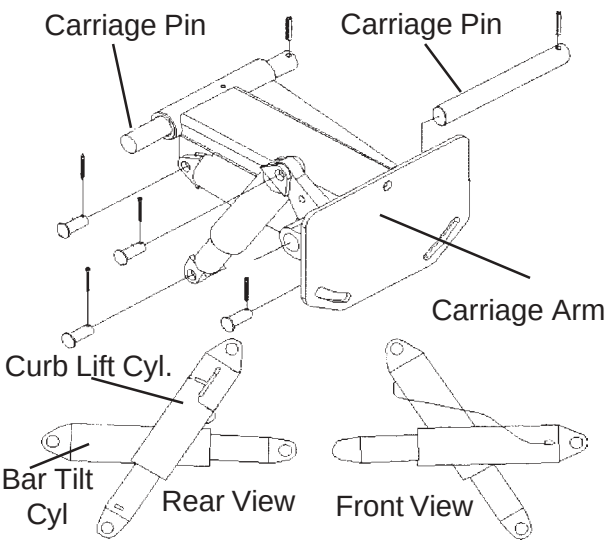

Figure 26

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KNIFE DRIVE REPAIR / REPLACEMENT

Knife Drive Assembly Repair / Replacement:

1. The knife drive assembly will be limited to the parts that can be replaced. The Actual knife drive subassembly is not a repairable part and will not have replacement parts available, components on the knife drive assembly can be replaced only.

2. It will not be require to remove any of the hydraulic hoses or even take them loose. The Motor can be unbolted from the drive assembly and laid aside with the hoses still connected. The motor has a splined shaft that mates to the hub adapter.

3. Looking down at the planetary drive (and Hydraulic Motor Assembly) there are four nuts in the plate that is attached to the drive assembly. Remove these four nuts, if you want to remove the four carriage bolts the skid shoe will have to unbolted and removed. When lifting the drive assembly up and away from the cutter bar take notice of the four tube spacers under the drive assembly, there are two different length of the spacers. The short ones go to the rear and the long ones go to the front (See Figure 22)

4. **There are two ways to remove the knife drive assembly** from the cutter bar knife head weldment.

5. **1 st**. is to remove the two knife drive bolt that retain the knife drive stud to the drive assembly support bracket, this allows the drive stud bearing assembly to stay with the cutterbar (See Figure 27) .

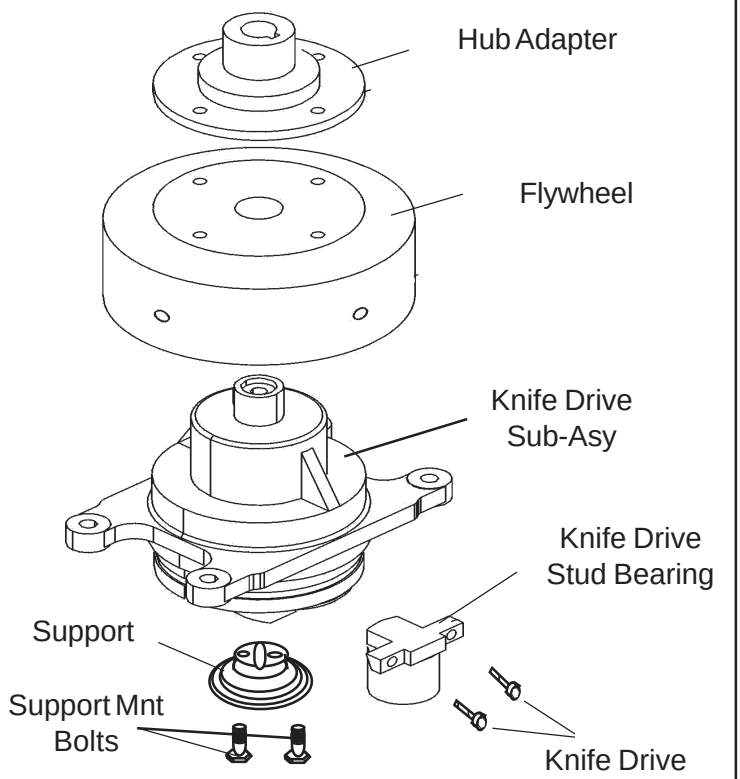

Figure 27

6. Or **2 nd**. there is a clamp bolt on the Knife Head Weldment, loosen the clamp bolt, this will allow the Knife drive stud bearing to pull out of the knife head weldment clamp or off the knife drive stud bearing assembly. (See Figure 23 & 24) Once the drive assembly has been lifted off you will see a nylon bearing in the knife bar head clamp, it should have stayed in the clamp or it could have stayed on the knife drive stud bearing assembly (See Figure 23 & 27)

7. The Hub Adapter is bolted to the Flywheel with four bolts, the flywheel is pressed down over the top shaft of the drive subassembly. The Knife stud bearing support bolts to the bottom of the drive subassembly with two bolts. The Knife drive stud bearing bolts to the support bracket (See Figure 27). If you unbolted the stud drive and left it in the cutter bar it should be removed and inspected. This stud drive is a sealed bearing drive assembly, there are no replaceable parts in it so it can only be replace as an assembly. To check the stud drive bearing assembly hold the top where the two bolts mount it to the support bracket. Grab the OD of the stud drive and the outer cover should spin freely while the top for the two bolts will not, it should not be rough or out of round. To work properly it must be free and smooth turning. Check the nylon bearing in the knife head weldment, it has to be in good condition also. This nylon bearing does not turn when installed, it acts solely as a bushing between the clamp and stud drive bearing assembly and prevent the clamp from crushing the drive stud bearing. (See Figure 22, 23 & 27)

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KNIFE DRIVE REPAIR / REPLACEMENT

8. To reassemble the Knife Drive Assembly reverse the disassembly steps but first the cutter bar must be made ready. If the drive stud assembly was not removed from cutterbar knife head weldment (See Figure 22, 23 & 27) and you do not plan to loosen the clamp around the nylon nearing on knife drive stud, you will not need to do this. IF the drive stud is removed the cutter bar head clamp will need to be prepared. Loosen the clamp bolt to where the nylon bearing (bushing) can be installed into the clamp, reinstall the clamp bolt into clamp **BUT DO NOT** tighten clamp bolt. Insert the drive stud bearing into the nylon bearing of clamp, still **DO NOT** tighten the clamp bolt.

9. Install the support bracket to the lower side OD the knife drive assembly, these e are two 8 mm bolts that screw into the knife drive assembly bottom side. Torque the 8 mm bolts to 20 ft. lbs.

10. Install the Tube spacers over the carriage bolts, remember the long ones go in the front and the short ones go in the rear. Set the drive assembly down over the four bolts where it is setting on the four tube spacers. Install the motor adapter down over the same four bolts (See Figure 28), The Drive assembly can be tightened down now, these are 1/2" grade 8 plow bolts and should be torqued to 100 to 110 ft. lbs.

11. From the bottom of the drive assembly turn the drive assembly, (there are holes in the outer diameter of the flywheel that can be used to turn it by inserting a bar into the hole). Align the drive assembly support bracket with the two bolt holes for the drive stud bearing, **KEEP YOUR HAND** away from the cutting blades they are sharp. After the two 10 mm bolts are installed into the drive stud bearing torque them to 35 ft. lbs. The drive assembly can be checked prior to bolting on the motor. Use a punch or rod that can be inserted into the hole on the OD of the flywheel (KEEP YOUR HANDS OUT OF THE KNIVES). This will check to make certain the cutter bar is not binding and also check to make certain the drive stud bearing is rotating freely.

12. With the drive assembly bolted down to the skid shoe weldment and the knife drive stud bolted to the support bracket at the bottom of the knife drive assembly. The Clamp Bolt on the knife head weldment will need to be tighten down, **CAUTION MUST BE USED** when tightening the clamp bolt to prevent the knife drive stud beading from being damaged. Before tighten you should be able to slide the knife head weldment with the nylon bearing in it to slide the bearing and knife head weldment up and down slightly on the knife drive stud bearing. Slowly tighten the clamp bolt checking this up and down movement. When you have tighten the clamp bolt and all the up and down movement between the knife head weldment (Nylon Bearing) is removed the clamp bolt will be tight enough. Do not over tight clamp bolt as damage to the knife drive stud bearing can be damaged. The Knife head weldment clamp has to be in the right position up and down on the knife drive stud bearing so the cutter bar in center for height to match the cutter bar.

13. Install the Motor onto the hub adapter by aligning the Key on the motor shaft with the key slot in the adapter hub. Install and tighten the two 1/2"-NC X 1-1/4" GR 5 bolts that retain the motor to the drive assembly (See Figure 28). the hoses should all ready be connected, but if they are not you will need to consult the hydraulic schematic (See Figure 1) showing the hose routing for the motor.

14. Recheck all the installation to make certain that the bolts have all been installed and are tightened to the required torque. Make certain all guards and shield have been reinstalled before starting tractor or mower.

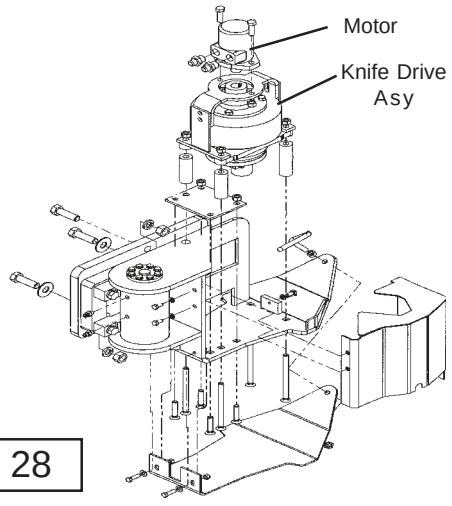

Figure 28

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Section 3

Cylinder & Two Spool

Control Valve Repair

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INTRODUCTION TO REPAIRS

INTRODUCTION: In Most diagrams there are no Component Part Numbers Listed, Only Item numbers and Descriptions, This is because most parts shown as breakdown in drawings are for location & identification only and if available as replacement parts will be listed in the Parts/Operators Manual. NO Dirt at all should be around Parts during repairs.

BEFORE STARTING REPAIRS: Service Rules (READ THIS)

1. Remove Front Cover. Clean Pump and surrounding area completely before removing any connec tions or Lines. NO DIRT OR DEBRIS CAN BE ALLOWED ON OR NEAR HYDRAULIC SYSTEM IF IT IS BEING WORKED ON, ANY DIRT OR CONTAMINANTS IN SYSTEM NO MATTER HOW SMALL WILL DAMAGE SYSTEM!
2. After cleaning around all connections thoroughly, Disconnect all connections, Lines, Hoses, Wiring and Remove the Pump Completely from the Tractor. Plug all hoses and Lines on Tractor and on Pump, DO NOT leave any open Lines. NO Contamination Should be allowed into system at all.
3. Clean Area, Clean all Tools, Pans etc. The cleaning of Area and Tools MUST be done before moving (Cleaned) Pump there. Drain Oil from Pump, Recheck outside of Pump to Make Sure it is Clean
4. After disassembly of Pump wash all metal components in clean solvent.
5. Use compressed Air to dry parts after washing (Compressed air must be filtered and moisture free). DO NOT wipe them dry with Paper Towels or Cloth as these will leave lint and/or dust contamination. DO NOT USE Compressed Air to spin any component (Such as Bearings or Plates) as this will damage them and could be dangerous.
6. Always use new Seals when reassembling Hydraulic Pumps, Lubricate the new rubber Seals with a Petroleum Jelly, (Vaseline) before installing them.
7. DON'T reinstall worn/damaged Parts in Pump, DO NOT Use a worn/damaged Pump Housing.
8. Torque all Bolts over Gasketed Joints. Then repeat the Torque sequence to make sure Bolts are tight, some times Gaskets can give a Torque reading that is OK but is not, so always recheck Torque.
9. Verifying the accuracy of Pump Repairs on an authorized test stand is essential.

RECOMMENDED TOOLS:

1. Hex Allen Wrench (Qty 5) (9/16", 5/32", 5/16", 3/32", 5/64"
2. Retaining Ring Pliers (Qty 3), 1 each of Internal (Straight .070 tip) internal (Straight .090 tip) & 1 each External (Straight 0.90 tip)
3. Retaining E-Ring Applicator (Qty 2), 1 each 9/32" & 1 each 1/2".
4. O-Ring Pick (Qty 1)
5. End Wrench (Qty 4), 1 each of 7/16", 9/16", 3/4", 1"
6. Torque Wrench (Qty 1), 0 to 100 ft. lbs. (135.6 nm) capacity
7. Hammer, Soft Face (Qty 1)
8. Seal Driver Set (Qty 1)
9. Arbor Press (Qty 1)
10. Sockets (Qty 3) 7/16", 9/16", 3/4" , Drive Size should match Torque Wrench Drive)
11. Light Petroleum Jelly (Vaseline)
12. Locktite, # 222 and #277 or equivalent (Qty 1 tube each)

RECOMMENDED GAUGES FOR DIAGNOSTICS:

1. Inlet Vacuum: 30 PSI to 30 in Mercury (207 bar to 0 bar)
2. System Pressure Gauge: 6,000 PSI (700 bar)
3. Charge Pressure Gauge: 0 to 500 PSI (0 to 25 bar)

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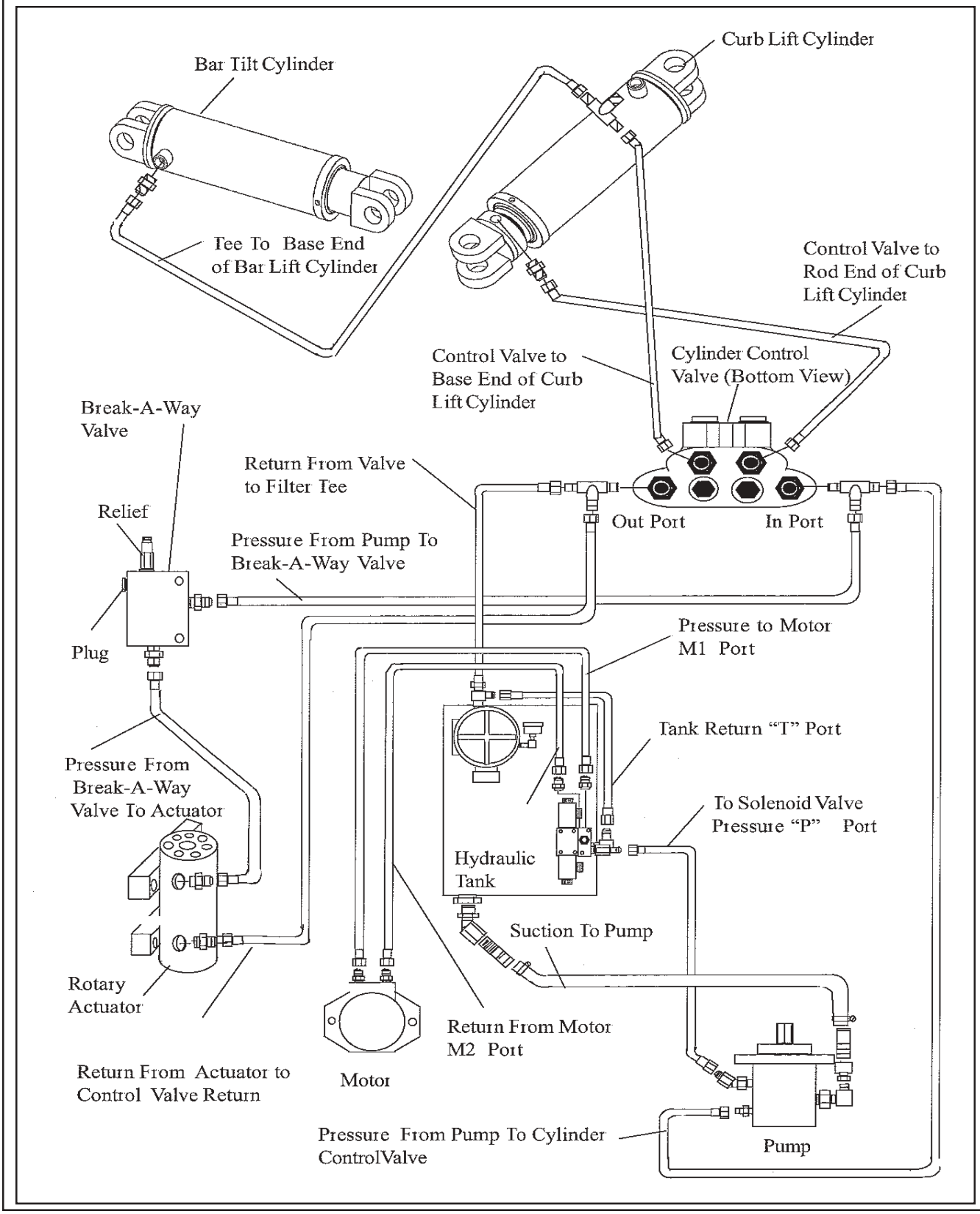
HYDRAULIC DIAGRAM - SINGLE RH WING

Shown below is the Hydraulic Diagram for the Single RH Wing Model


Curb Lift Cylinder
Bar Tilt Cylinder
Tee To Base End of Bar Lift Cylinder
Control Valve to Rod End of Curb Lift Cylinder
Control Valve to Base End of Curb Lift Cylinder
Cylinder Control Valve (Bottom View)
Break-A-Way Valve
Return From Valve to Filter Tee
Relief
Out Port
In Port
Pressure From Pump To Break-A-Way Valve
Plug
Pressure to Motor M1 Port
Tank Return "T" Port
Pressure From Break-A-Way Valve To Actuator
To Solenoid Valve Pressure "P" Port
Hydraulic Tank
Suction To Pump
Rotary Actuator
Return From Motor M2 Port
Return From Actuator to Control Valve Return
Motor
Pressure From Pump To Cylinder ControlValve
Pump

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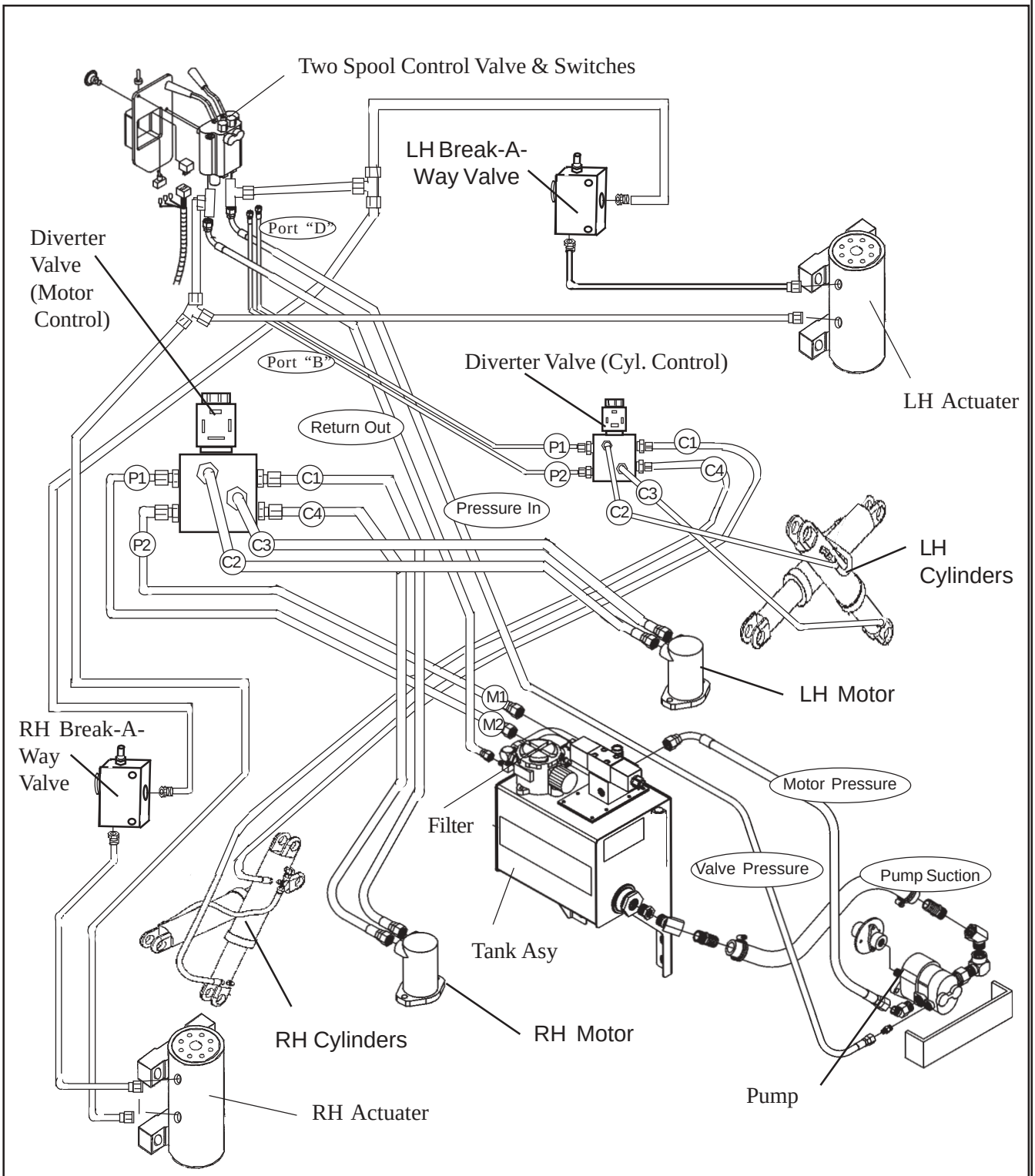
HYDRAULIC DIAGRAM - DUAL WINGS

Shown below is the Hydraulic Diagram for the Dual Wing Model



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NOTES

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TWO SPOOL CONTROL VALVE REPAIR

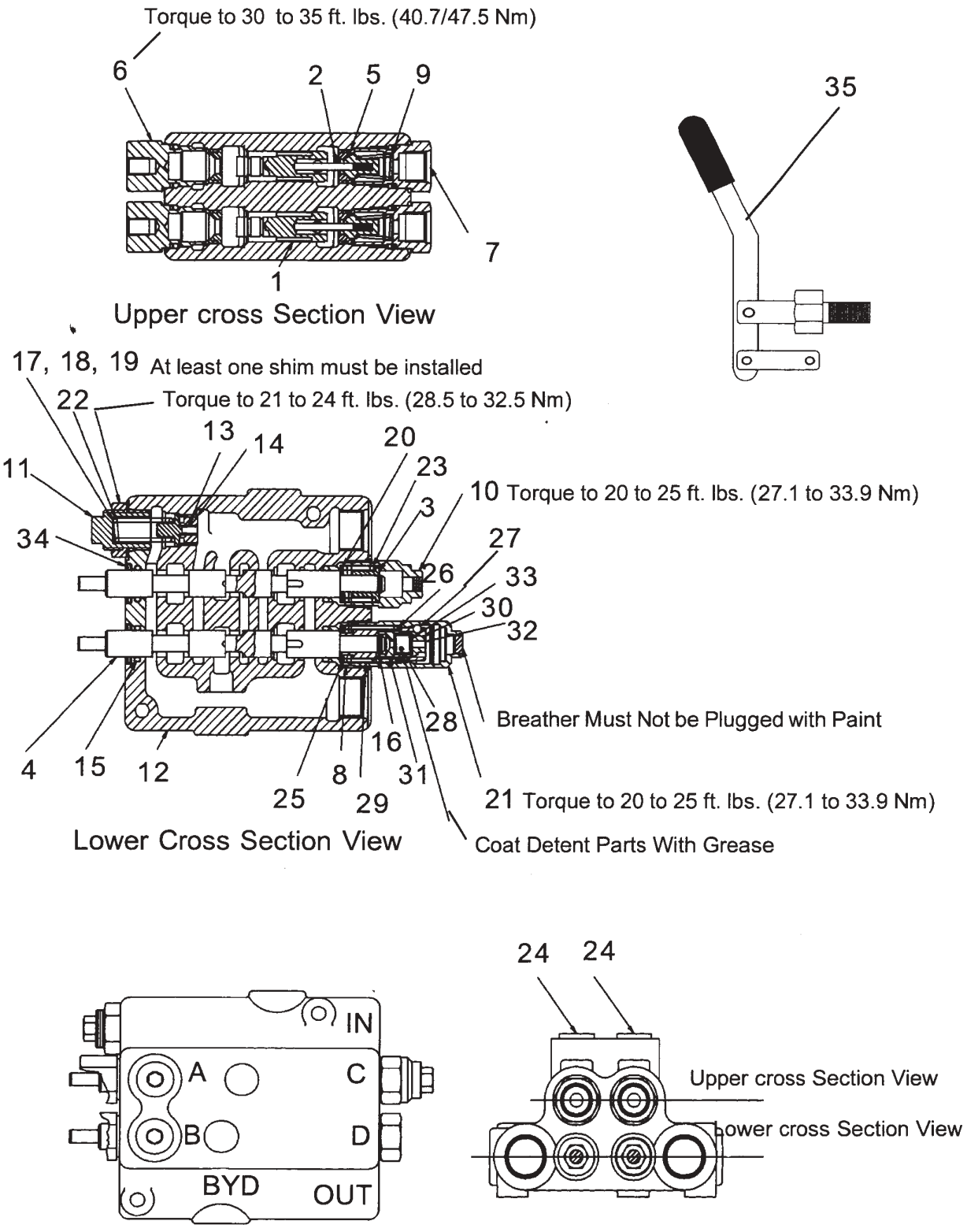

Figure 29

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TWO SPOOL CONTROL VALVE REPAIR

Item	Part No.	Qty.	Description	Item	Part No.	Qty.	Description
	02982077	--	Valve Asy. W/ Fittings	21.	02976946	1	Cap Asy.
	02974306	--	Valve Asy. W/O Fittings	22.	02976945	4	Spring
1.	02976934	2	Unload Plunger	23.	02966669	1	Spring
2.	02966645	2	Poppet Asy.	24.	02976944	2	Plug Asy.
3.	02966646	1	Spacer	25.	02976943	1	Washer
4.	02976933	2	Spool	26.	02976942	1	Washer
5.	02966648	4	Seat Asy.	27.	02976941	3	Ball
6.	02966649	2	Plug Asy.	28.	02976940	1	Spring
7.	02966650	2	Plug Asy.	29.	02976939	1	Spring
8.	02966651	2	Bushing	30.	02976938	1	Cone
9.	02966652	2	Lockout Spring	31.	02976937	1	Spacer
10.	02966653	1	Cap Asy.	32.	02976936	1	Adapter Cap
11.	02966654	1	Plug Asy.	33.	02976935	A/R	Washer
12.	02976932	1	Body	34.	02966671	2	Wiper Seal
13.	02976931	1	Poppet	35.	02976957	2	Handle Kit
14.	02976930	1	Seat	36.	02968850	2	Adapter,Straight 8MB - 6MJ
15.	02966657	4	O-Ring				
16.	02966658	2	Retaining Ring	37.	03200284	2	Adapter,Straight 6MB - 4MJ
17.	02966659	A/R	Washer				
18.	02966660	A/R	Washer	38.	02965166	2	Adapter,Tee 6FJX - 6MJ - 6MJ
19.	02966661	A/R	Washer				
20.	02966662	1	Washer	39.	02982479	2	Adapter, Straight 4MB - 6FJX

Two Spool Control Valve Repair:

The two spool valve assembly shown (See Figure 29 & 30) show the components that are replaceable in the two spool control valve. Study the drawings, the torque specification if any are listed for figure 29. The fittings are shown in figure 30. When working on valve always clean the exterior of the valve and hoses before disconnecting them. After disconnecting the hoses cap them with clean caps to keep contamination out of hydraulic system. When disassembling the valve make certain the OD of it and all work areas are clean, do not use dirty tools or rags that will leave lint. Only lint free towels (paper or suitable type) can be used to wipe down the hydraulic system. If any components need to be held in the valve body during assembly petroleum jelly can be used. DO NOT Exceed the recommended torque setting listed in figure 29. When removing plug item 11 watch the qty of washers that are removed, this amount is what should be started with when reassembling plug.

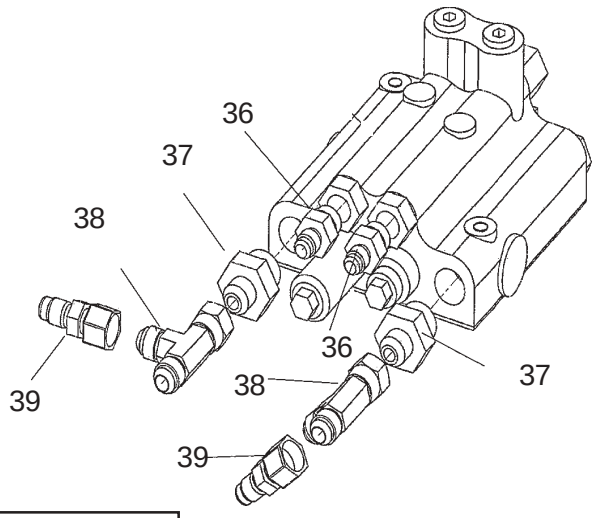

Figure 30

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REMOTE CONTROL CABLES

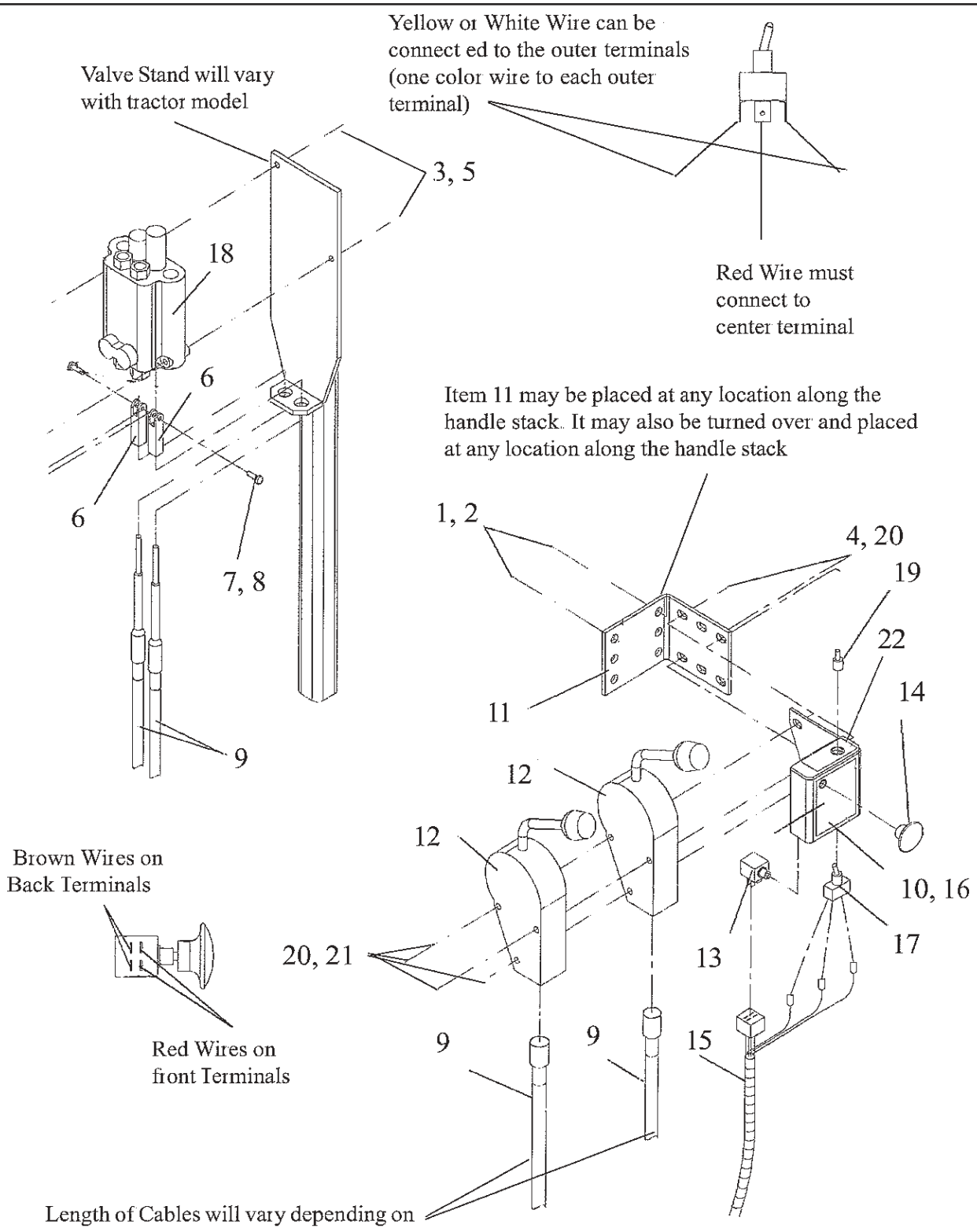
Yellow or White Wire can be connect ed to the outer terminals (one color wire to each outer terminal)
Valve Stand will vary with tractor model
3, 5
18
6
6
7, 8
9
Red Wire must connect to center terminal
Item 11 may be placed at any location along the handle stack. It may also be turned over and placed at any location along the handle stack
1, 2
4, 20
19
22
14
11
12
12
10, 16
17
13
15
20, 21
9
9
Brown Wires on Back Terminals
Red Wires on front Terminals
Length of Cables will vary depending on tractor model used. See Length of cables listed to determine which is used. Qty of two cables required per unit.
Item 10: Switches must be installed & Harness must be connected before attaching switch (item 10) to control sticks

Figure 31

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REMOTE CONTROL CABLES

Item	Part No.	Qty.	Description
1	00015800	2	Locknut, Toplock 3/8"-NC PLB
2	000354	2	Bolt, Hex Head 3/8"-NC X 1-1/8" PL GR5
3	001636	2	Bolt, Hex Head 1/4"-NC X 2"
4	00750940	3	Locknut, Toplock 5/16"-NC PLB
5	02959924	2	Locknut, Toplock 1/4"-NC PLB
6	02966687	2	Adjusting Yoke End
7	02966688	2	Clevis Pin, 3/16" X 7/8"
8	02968698	2	Cotter Pin 3/32" X 3/4"
9	02971200	a/r	Cable, Remote Control - 48" Long
	02971201	a/r	Cable, Remote Control - 60" Long
	02971202	a/r	Cable, Remote Control - 72" Long
	02971203	a/r	Cable, Remote Control - 102" Long
10	02974296	1	Switch Mount Weldment
11	02974299	1	Angle Mount
12	02974323	2	Angled single axis Control Asy.
13	02964028	1	Switch, Push Pull (w/Items 14)
14	02982367	1	Knob (Replacement for Item 13)
	02982366	1	Panel Jam Nut, 3/8"-NF (Replacement for Item 13)
	02982365	1	Face Nut, 3/8"-NF (Replacement for Item 13)
15	02964318	1	Relief Valve (Set @ 2500 psi)
16	02974321	1	Decal, Valve & Switch Instructions
17	02974322	1	Toggle Switch, 3 Position
18	02982077	1	Valve Asy w/Fittings
19	02974962	1	Boot, Toggle Switch Cover
20	00023500	6	Flatwasher, 5/16" Type AW,ZP
21	02733700	3	Bolt, Hex Head 5/16"-NC X 4-1/2" PL gr5
22	02975270	1	Decal, Reversing Switch Instructions

NOTE: Remote control cables are used on tractors with cabs mostly, These remote cable will be shipped with the tractor mount kit. The cables will vary in length as to which tractor model is used to mount the switch blade on. For replacement cable assemblies match the length of the cable above. There are two cables per unit required. The length of cable can also vary as to where the valve is mounted.

Control Cable Connection to Control Stick Assemblies:

First remove the Cross- Screw from the bottom of the Control Stick Assembly. **DO NOT** remove the screws that fasten the two housings halves together.

Next holding the housing, fully shift the Handle in the Control Stick Assembly to expose the female-threaded end of the Plunger Rod.

Then while holding the Handle to expose the Plunger Rod, thread the Threaded Bead of the Cable into the end of the Plunger Rod and tighten securely. Release the Handle, allowing the Cable to pull into the Control Stick Assembly.

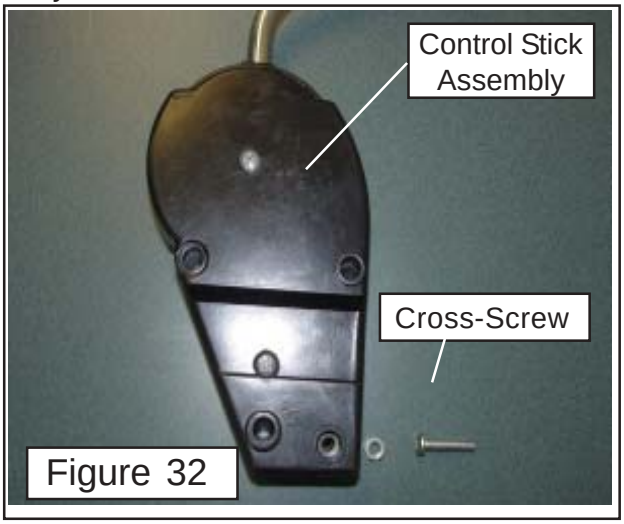

Figure 32

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REMOTE CONTROL CABLES

Once Cable is attached to Plunger Rod, slide the silver Conduit Sleeve into the bottom of the Control Stick Assembly and align the groove in the Conduit Sleeve with the Cross-Screw Hole.

Finally Reinstall the Cross- Screw and tighten securely (See Figure 31 thru 36)

Push Pull Switch & Reversing Toggle Switch:

The push pull switch mount to the valve stand on not cab tractors and to the remote valve control cable handle mount on a cab model. On Cab models the switch can be mounted some where else if that is what the customer wanted (See Figure 31 & 37)

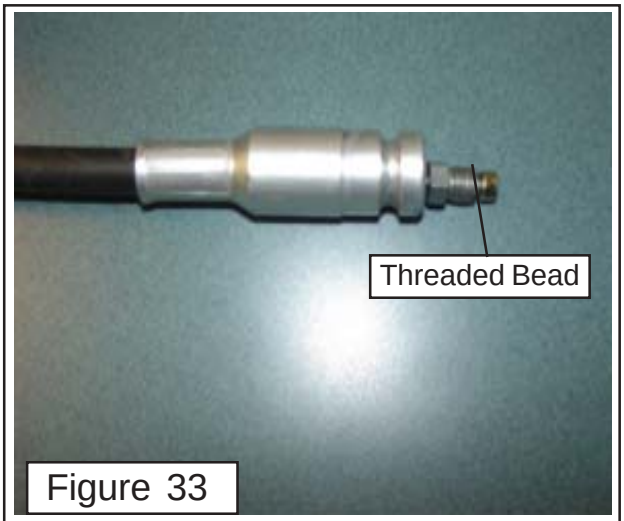

Figure 33

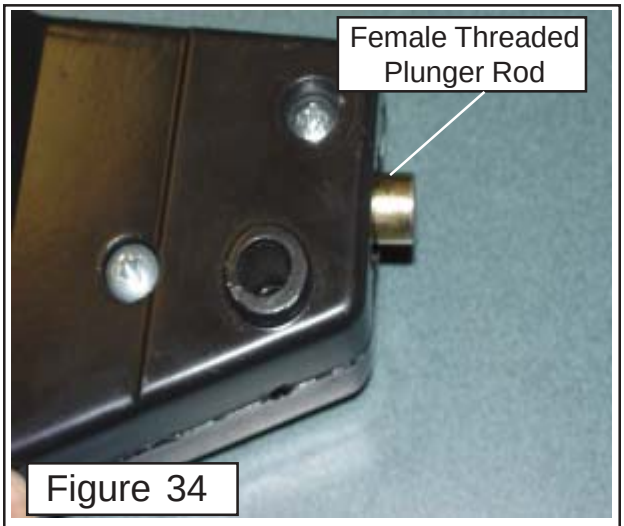

Figure 34

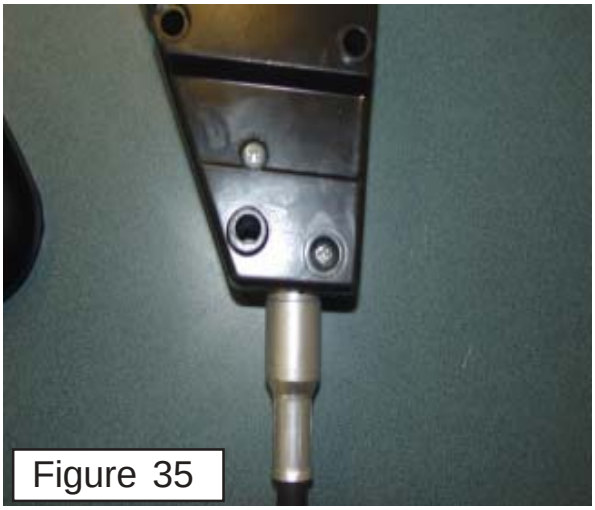
Figure 35

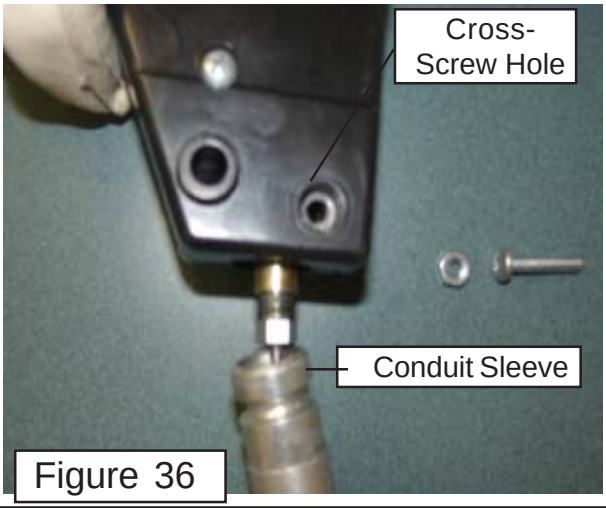

Figure 36

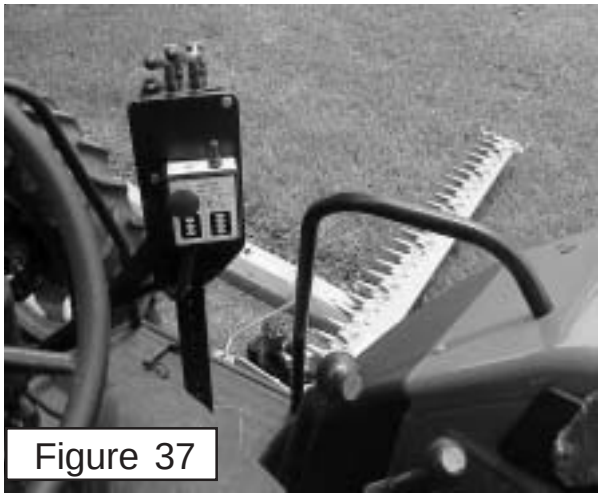
Figure 37

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BAR TILT CYL. P/N 0693500A REPAIR

Bar Tilt Cylinder Repair:

1. The Bar Tilt Cylinder is a single stage cylinder with one port on the base end (See Figure 38). The Bar Tilt Cylinder connects to the carriage arm and the hose will be tee'd off of the other cylinder (See Figure 1) as the two cylinders will react together when the bar tilt cylinder is activated (See Figure 39). Bar Tilt Cylinder is a 2-1/5" bore cylinder. The cylinder rod acts as the cylinder piston as the cylinder does not have a removable piston

2. Clean Tractor and Parts, the tractor and all components including hose must be cleaned and free of anything that will contaminate the hydraulic system. Keep all parts coated with oil to prevent rust.

3. Secure Tractor, Secure the tractor so as it can not be started unless you are ready for it to. Set the tractor parking brake.

4. Bar Tilt Cylinder Removal. Remove cylinder hose at the cylinder, use pan to catch any spilled oil when taking hoses loose. Cap the hoses and plug the cylinder port after disconnecting hoses. (See Figure 1)

5. Remove the two cylinder mounting pins by removing the cotter pins (See Figure 4) and then pulling the pins. Inspect the cylinder to make certain it is clean, make certain all tools and the work area are clean.

6. Remove Cylinder to Work Bench. Hold cylinder with port up until you get it to a drain pan to drain cylinder. It works best to secure cylinder in a vise, use caution not to tighten vise so tight it will squeeze the barrel out of shape. DO NOT clamp cylinder rod in vice. Use caution, as the cylinder is disassembled oil will flow out of it so you want to do this in an area where you are prepared to catch the oil.

7. Remove Cylinder Rod. The best way to disassemble the bar tilt cylinder is to use a hooked spanner wrench (See Figure 40), there is a hole in cylinder head so a spanner wrench can be used. A pipe wrench can be used but you will damage the exterior of the cylinder head by cutting it, if a pipe wrench is used make certain none of the pieces of metal from cylinder head are not allowed to get into the hydraulic oil system. The Cylinder Head (Item 2 Figure 41) is the cylinder head, it screws into the cylinder barrel. Unscrew the cylinder head with the spanner wrench and remove the cylinder rod with the cylinder head still attached to it, do this by pulling the rod out and the head will come out with it.

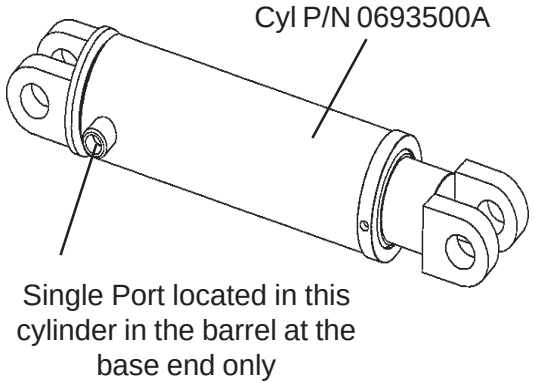

Figure 38

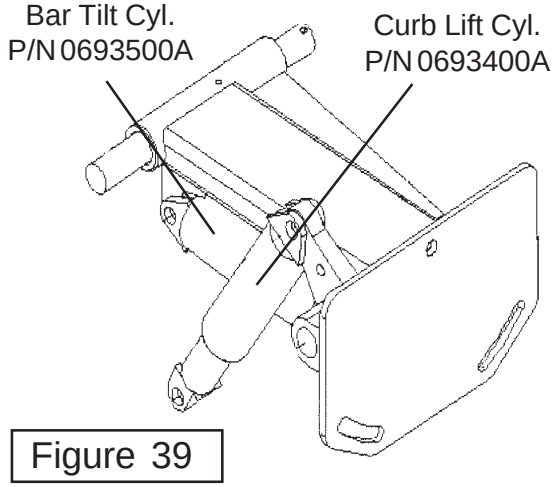

Figure 39

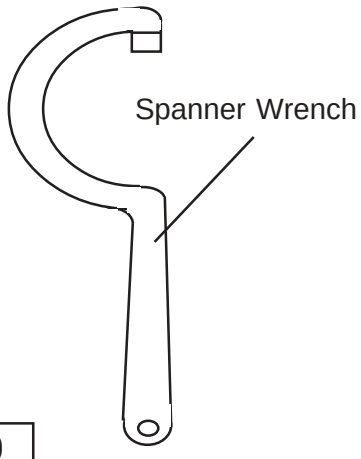

Figure 40

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BAR TILT CYL. P/N 0693500A REPAIR

8. Cylinder Rod when removed will still have the cylinder head attached to it. There is wire ring on the inner end of the cylinder rod (item 8 Figure 41) that will need to be removed and the cylinder head will slide off the rod. Inspect the rod for wear or pitting, replace if required.

9. Cylinder Head, the cylinder head once it has been slid off rod you can inspect it and replace as required, replace the seals in the head with new seals. There are two seals in the ID of the head, an inner rod seal (Item 6 Figure 41) and the outer rod seal (Item 7 Figure 41). The outer rod seal is a snap in seal and is installed from the OD, the inner seal is in a groove in the ID of the Head. After these two seals have been replaced there is an outer o-ring and backup washer on the OD of the head (Item 4 & 5 Figure 41) the o-ring will be to the inside of the cylinder and the back up washer will be to the outside, if these are reversed the head could leak under pressure (See Item 4 & 5 Figure 41). Coat the ID of the cylinder rod with clean hydraulic oil. Reinstall head onto cylinder rod in the same direction it came off, install a new wire ring to cylinder rods inner end (item 8 Figure 41)

10. Cylinder Barrel, the cylinder barrel needs to be inspected for condition, the cylinder barrel can be honed if needed but as there is no piston in the cylinder, honing would only accomplish removing any contamination stuck to cylinder barrel walls which should be removed to keep contamination out of the hydraulic system.

11. Install Rod and Cylinder Head into Barrel. Before installing the rod and cylinder head apply locktite # 242 to the first two threads of cylinder head in three places 120 ° apart. Then using the spanner wrench screw the cylinder head into the barrel until the head is tight in barrel.

12. Cylinder Port, The cylinder port has a built in restrictor by having a small 3/64" hole through the barrel of cylinder from port. DO not enlarge this hole from the 3/64" size as this would cause cylinder to operate to fast and could cause problems.

13. Reinstall Cylinder, the cylinder will be connected to the carriage arm the same as it was removed. Install the cotter pins in the cylinder retaining pins. Reconnect the hose to the cylinder making certain that the cylinder and hoses are connected correctly (See Figure 1).

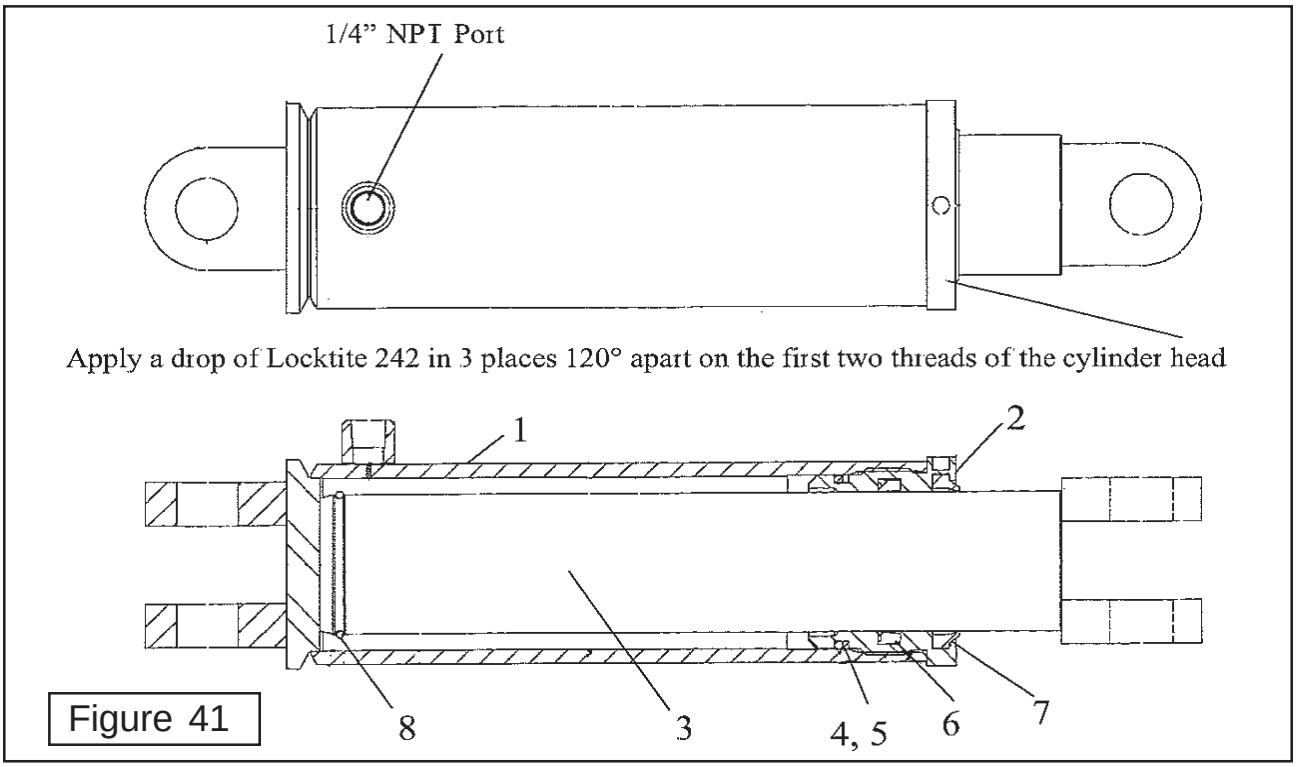

Figure 41

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CURB LIFT CYL. P/N 0693400A REPAIR

Bar Tilt Cylinder Repair:

1. The Curb Lift Cylinder is a triple stage cylinder with two ports, one on the base end and one on the rod at the rod end. (See Figure 42). The Curb Lift Cylinder connects to the carriage arm and there are two hoses that are connected from the control valve. The top hose (Base end) will connect to a Tee and then connect to the Bar lift Cylinder (See Figure 1) as the two cylinders will react together when the Curb Lift cylinder is activated (See Figure 1 & 43). The cylinder has a tube inside it that has rod inside of it, this is how this cylinder works as a triple stage cylinder when extended outward.

2. Clean Tractor and Parts, the tractor and all components including hose must be cleaned and free of anything that will contaminate the hydraulic system. Keep all parts coated with oil to prevent rust.

3. Secure Tractor, Secure the tractor so as it can not be started unless you are ready for it to. Set the tractor parking brake.

4. Curb Lift Cylinder Removal. Remove cylinder hoses at the cylinder, use pan to catch any spilled oil when taking hoses loose. Cap the hoses and plug the cylinder port after disconnecting hoses. (See Figure 1)

5. Remove the two cylinder mounting pins by removing the cotter pins (See Figure 4) and then pulling the pins. Inspect the cylinder to make certain it is clean, make certain all tools and the work area are clean.

6. Remove Cylinder to Work Bench. Hold cylinder with port up until you get it to a drain pan to drain cylinder. It works best to secure cylinder in a vise, use caution not to tighten vise so tight it will squeeze the barrel out of shape. DO NOT clamp cylinder rod in vice. Use caution, as the cylinder is disassembled oil will flow out of it so you want to do this in an area where you are prepared to catch the oil.

7. Remove Cylinder Rod. The best way to disassemble the bar tilt cylinder is to use a hooked spanner wrench (See Figure 44), there is a hole in cylinder head so a spanner wrench can be used. A pipe wrench can be used but you will damage the exterior of the cylinder head by cutting it, if a pipe wrench is used make certain none of the pieces of metal from cylinder head are not allowed to get into the hydraulic oil system. The Cylinder Head (Item 2 Figure 45), it screws into the cylinder barrel. Unscrew the cylinder head with the spanner wrench and remove the cylinder rod (Item 5 Figure 45) and inner rod weldment (item 4 Figure 45) with the cylinder head still attached to it, do this by pulling the cylinder rod (item 5 Figure 45) out, the cylinder head, cylinder rod and rod weldment will come out with it. Remove Wire Ring (item 13 Figure 45) and the cylinder head will slide off rod weldment (item 4 Figure 45).

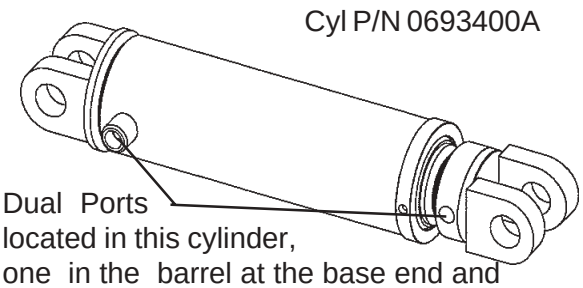

Figure 42

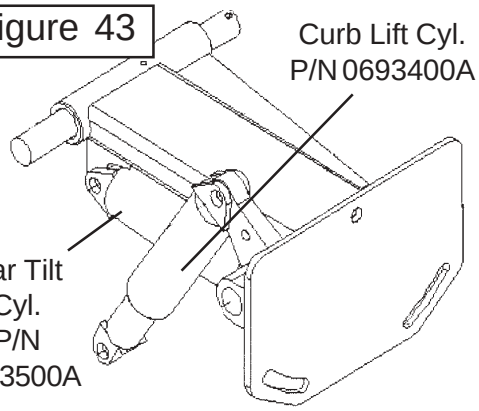

Figure 43

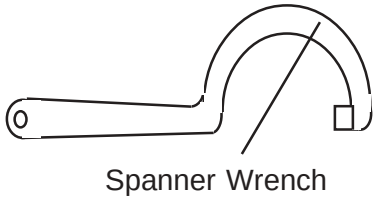

Figure 44

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CURB LIFT CYL. P/N 0693400A REPAIR

8. Cylinder Rod & Piston. Cylinder rod (item 5 Figure 45) will pull out of rod weldment from the back side, it has the piston (Item 3 Figure 45) on it and will come out with it. The Piston is pressed on the cylinder rod, if removing the piston first remove the piston retaining nut (Item 6 Figure 45), this needs to be done carefully so as not to damage the piston or cylinder rod. The piston will need to be pressed off of the cylinder rod and pressed back on when replaced, use loctite 271 or equivalent when pressing piston on is a must. Install a new piston retaining nut and torque it to the required torque as per the bolt torque chart. Install new piston seals and wipers (items 7 & 11 Figure 45). Coat the piston and seals with a coat of oil and slide the rod into the rod weldment, set the rod and the rod weldment aside for now.

9. Cylinder Head, the cylinder head once it has been slid off rod weldment (Items 10 & 12 Figure 45) you can inspect it and replace as required, replace the seals in the head with new seals. There are two seals in the ID of the head, an inner rod seal (Item 10 Figure 45) and the outer rod seal (Item 12 Figure 45). The outer rod seal is a snap in seal and is installed from the OD, the inner seal is in a groove in the ID of the Head. After these two seals have been replaced there is an outer o-ring and backup washer on the OD of the head (Item 8 & 9 Figure 45) the o-ring will be to the inside of the cylinder and the back up washer will be to the outside, if these are reversed the head could leak under pressure (See Item 8 & 9 Figure 45). Coat the ID of the cylinder rod weldment with clean hydraulic oil. Reinstall head onto cylinder rod weldment in the same direction it came off, install a new wire ring to cylinder rod weldment inner end (item 13 Figure 45)

10. Cylinder Barrel, the cylinder barrel needs to be inspected for condition, the cylinder barrel can be honed if needed but should not be honed to oversized.

11. Install Rod, Rod Weldment and Cylinder Head into Barrel. Before installing the rod, rod weldment and cylinder head apply locktite # 242 to the first two threads of cylinder head in three places 120 ° apart. Then using the spanner wrench screw the cylinder head into the barrel until the head is tight in barrel.

12. Cylinder Port, The cylinder port has a built in restrictor by having a small 3/64" hole through the barrel of cylinder from port. DO not enlarge this hole from the 3/64" size as this would cause cylinder to operate to fast and could cause problems.

13. Reinstall Cylinder, the cylinder will be connected to the carriage arm the same as it was removed. Install ne cotter pins in the cylinder retaining pins. Reconnect the hose to the cylinder making certain that the cylinder and hoses are connected correctly (See Figure 1).

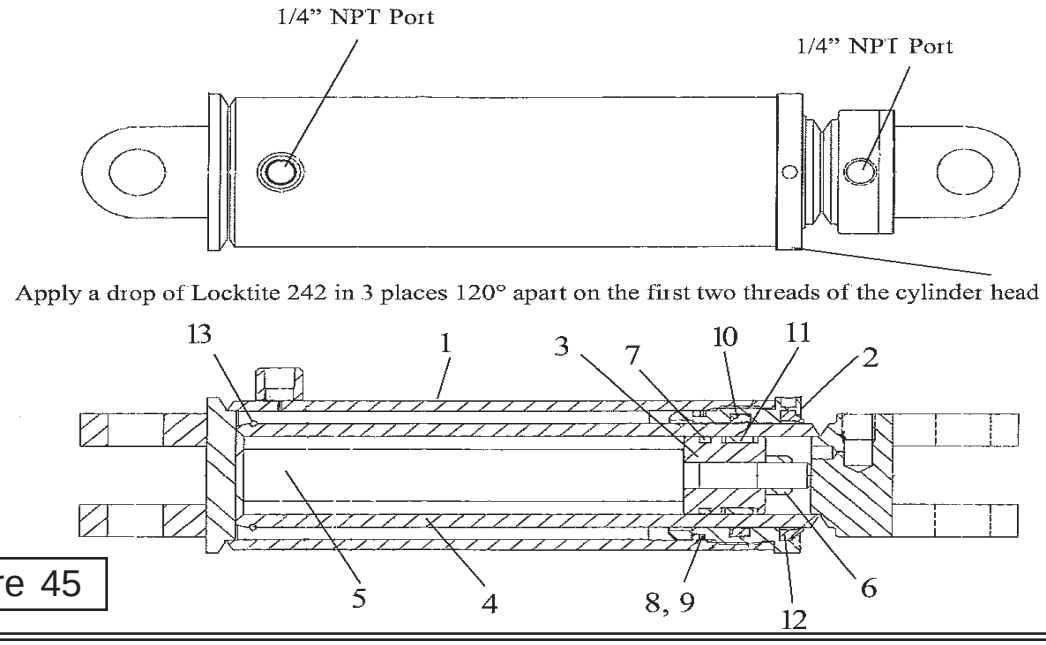

Figure 45

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Section 4

Hydraulic Motor Repairs

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INTRODUCTION TO HYDRAULIC REPAIR

INTRODUCTION: In Most diagrams there are no Component Part Numbers Listed, Only Item numbers and Descriptions, This is because most parts shown as breakdown in drawings are for location & identification only and may not be available as replacement part. replacement part numbers will be listed in the Parts/Operators Manual. NO Dirt at all should be around Parts during repairs.

BEFORE STARTING REPAIRS: Service Rules (READ THIS)

1. Remove Front Cover. Clean Pump and surrounding area completely before removing any connec tions or Lines. NO DIRT OR DEBRIS CAN BE ALLOWED ON OR NEAR HYDRAULIC SYSTEM IF IT IS BEING WORKED ON, ANY DIRT OR CONTAMINANTS IN SYSTEM NO MATTER HOW SMALL WILL DAMAGE SYSTEM!
2. After cleaning around all connections thoroughly, Disconnect all connections, Lines, Hoses, Wiring and Remove the Pump Completely from the Tractor. Plug all hoses and Lines on Tractor and on Pump, DO NOT leave any open Lines. NO Contamination Should be allowed into system at all.
3. Clean Area, Clean all Tools, Pans etc. The cleaning of Area and Tools MUST be done before moving (Cleaned) Pump there. Drain Oil from Pump, Recheck outside of Pump to Make Sure it is Clean
4. After disassembly of Pump wash all metal components in clean solvent.
5. Use compressed Air to dry parts after washing (Compressed air must be filtered and moisture free). DO NOT wipe them dry with Paper Towels or Cloth as these will leave lint and/or dust contamination. DO NOT USE Compressed Air to spin any component (Such as Bearings or Plates) as this will damage them and could be dangerous.
6. Always use new Seals when reassembling Hydraulic Pumps, Lubricate the new rubber Seals with a Petroleum Jelly, (Vaseline) before installing them.
7. DON'T reinstall worn/damaged Parts in Pump, DO NOT Use a worn/damaged Pump Housing.
8. Torque all Bolts over Gasketed Joints. Then repeat the Torque sequence to make sure Bolts are tight, some times Gaskets can give a Torque reading that is OK but is not, so always recheck Torque.
9. Verifying the accuracy of Pump Repairs on an authorized test stand is essential.

REQUIRED TOOLS:

1. Retaining Ring Pliers
2. O-Ring Pick (Qty 1)
3. End Wrench Set
4. Torque Wrench (Qty 1), 0 to 1200 In. lbs.
5. Hammer, Soft Face (Qty 1)
6. Seal Driver Set (Qty 1)
7. SocketsSet (Drive Size should match Torque Wrench Drive)
8. Light Petroleum Jelly (Vaseline)
9. Locktite, # 222 and #277 or equivalent (Qty 1 tube each)

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CYL, MOTOR & PUMP HYDRAULIC CIRCUIT

Switch Blade Cylinder, Motor & Pump Control Circuits:

The Cylinder control circuit is operated from the front half of the front mounted pump. The Pressure supply hose runs direct to the two spool valve. This supply hose is also the supply for the hydraulic break-a-way assembly. The Motor Circuit is supplied by the rear half of the pump.

If there is a problem with the hydraulic cylinder system or motor system, there are number of things that should be checked.

1. Check hose routing to make certain they are not kinked, damaged or have been connected wrong, this would be a visual inspection comparing them to the schematic drawing. (See Figure 1).
2. Check to make certain that the oil level is full as it should be at the tank. Add Oil as needed to bring oil to correct level as needed. See the side gauge on the side of the oil tank.
3. Inspect the two spool control valve to make certain the handles are moving the plungers freely in the valve body, this would be by work the handles to see if they are free.
4. Inspect the Tractor Engine to Pump driveshaft to make certain that it is working properly. If the driveshaft was broken then the cutter motor would not work either.
5. Inspect the hydraulic cylinders to make certain that they are not leaking internally. This should be a case where if the cylinders were leaking the head would have dropped when lifted with the hydraulics or there is oil running out of the cylinder end. Make certain the cylinder hoses are connected correctly, (See Figure 1).
6. The next step would be a flow & pressure test of the pump. The Motor Section and Cylinder Section of pump will need to tested separately as they work independently of each other. The Motor Section of the pump should produce 3.5 to 4.5 gpm and 3000 psi (80 % of this is serviceable). The cylinder circuit of the pump should produce 9 to 10 gpm and 1750 psi (80% of this is serviceable). These would be considered ok if the relief open at the designated pressure as listed above. The two spool valve has a 3000 psi relief in it and the motor control valve has a 1750 psi relief in it.
7. The Knife section will not reverse. The knife section (motor circuit) has an electric toggle switch that will change the direction of travel for the knife cutter bar. this is done by energizing the correct solenoid mounted on top of the motor control valve block on the tank. If switch does not reverse knife, check the power supply at the wire harness and on through harness to toggle switch and then on down through harness to the solenoid plug connection (See Figure 2). The toggle switch and wire harness can be tested using a volt meter and Ohm meter.

Reservoir Oil & Filter:

Dirty oil can destroy the hydraulic system. Dirt scores valve spools, cylinder plungers. Gouges metal from pump, motor thrust plates, gears and housings. If mower performance is lagging or system is running hotter than normal, the cause could be contamination or the wrong type oil. The oil reservoir has a filter condition gauge located on the filter housing. The filter will show in the red arc when the oil filter needs to be changed or when the oil temperature is below 100 degrees F. The oil filter should be changed after every 500 hours of operation or when the gauge shows in the red arc when the oil temperature is above 100 degrees F. When changing the return filter, also replace the breather filter element (P/N 02974319) located under the black cap. Refer to the Filter Assembly in the repair parts manual. The oil should be changed every 1500 hours of operation, the suction screen should be removed, inspected, cleaned or replaced as needed. There is a magnetic drain plug in the tank, inspect this plug for any metallic material that may be attached to it. The oil can be tested for contamination any time you suspect the oil might be contaminated. There are oil test kits that are available where you can send off a sample of oil to be tested and they will return the result to you or you can contact Alamo Industrial Technical Service Department for information about testing oil.

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HYDRAULIC DIAGRAM - SINGLE RH WING

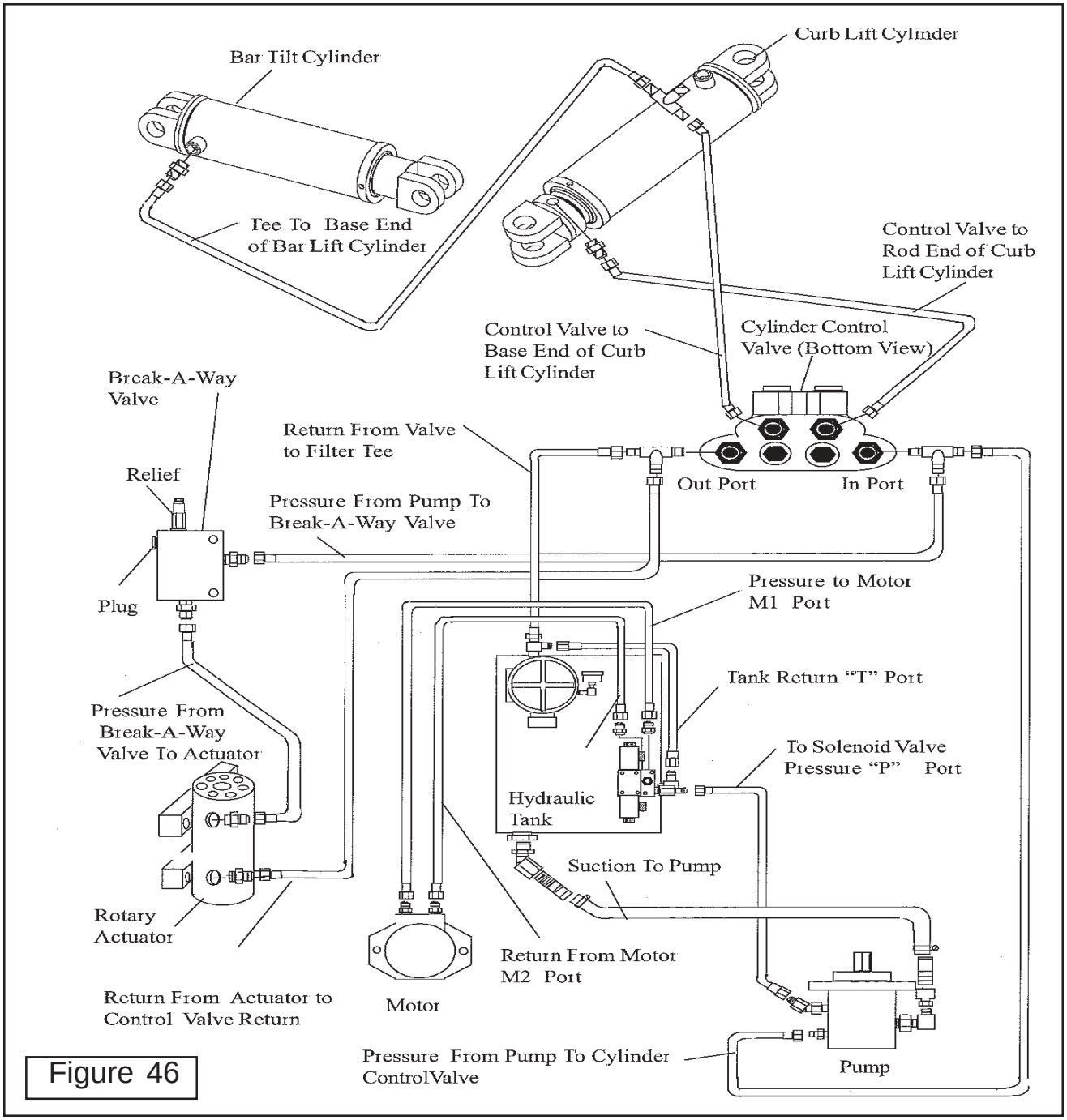
Bar Tilt Cylinder
Curb Lift Cylinder
Tee To Base End of Bar Lift Cylinder
Control Valve to Rod End of Curb Lift Cylinder
Control Valve to Base End of Curb Lift Cylinder
Cylinder Control Valve (Bottom View)
Break-A-Way Valve
Return From Valve to Filter Tee
Relief
Out Port
In Port
Pressure From Pump To Break-A-Way Valve
Plug
Pressure to Motor M1 Port
Tank Return "T" Port
Pressure From Break-A-Way Valve To Actuator
To Solenoid Valve Pressure "P" Port
Hydraulic Tank
Suction To Pump
Rotary Actuator
Return From Motor M2 Port
Return From Actuator to Control Valve Return
Motor
Pressure From Pump To Cylinder ControlValve
Pump

Figure 46

Hydraulic Hoses:

Most of the hydraulic hoses will vary in length and part number, this is because when mounting units on different tractors will require different length hoses (See Figure 1). When the unit was shipped it should have been shipped with assembly instruction sheets and/or assembly manual which should list the hose part numbers that apply to the application. Retain these records for future use in ordering parts. NOTE: Do not use Teflon Tape on any hydraulic fittings, use only liquid sealer on NPT fitting and only on the OD of fitting never the ID.

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HYDRAULIC DIAGRAM - DUAL LH WING

Shown below is the Hydraulic Diagram for the Dual Wing Model

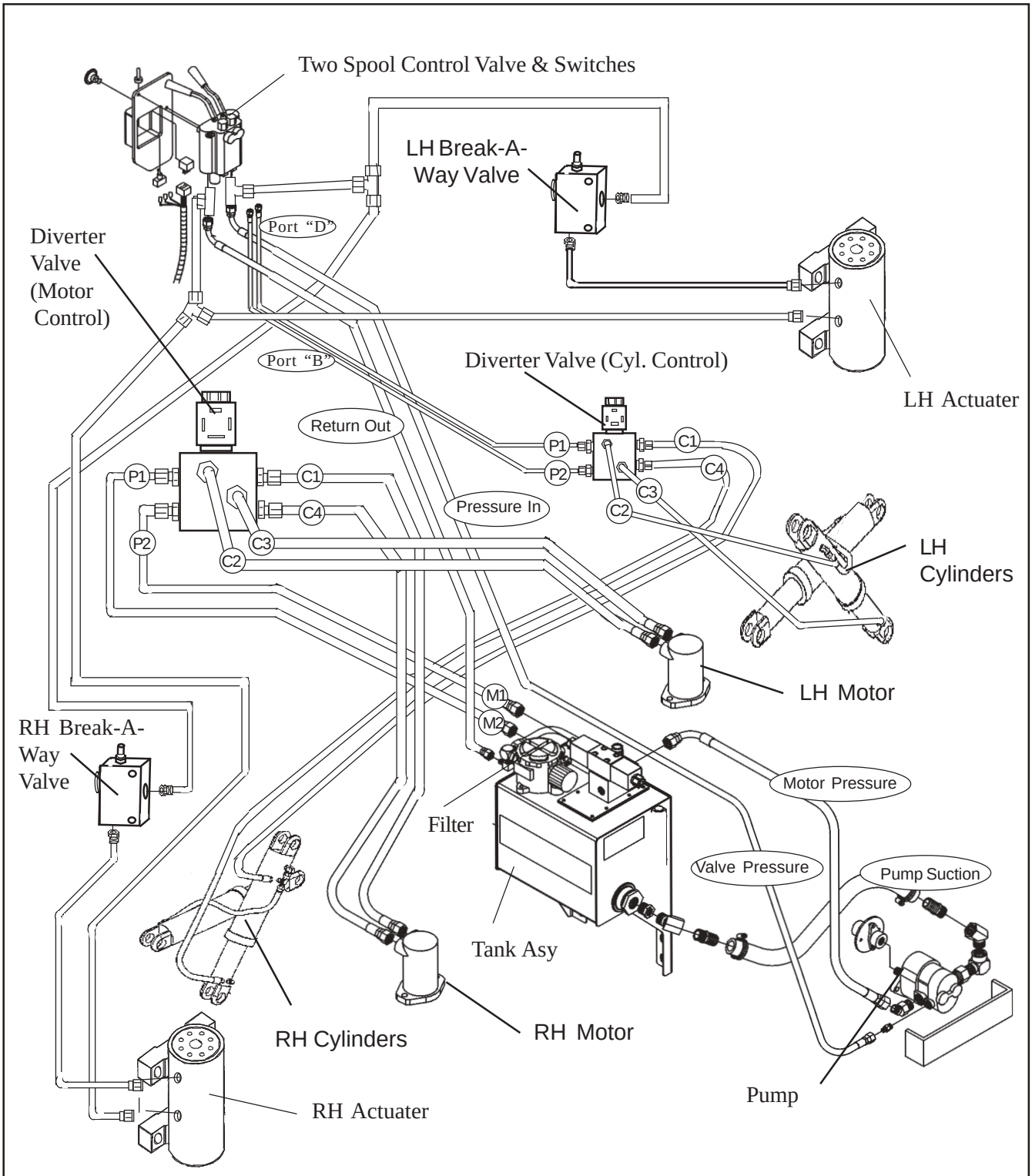

Figure 46A

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MOTOR P/N 02974301 DIS-ASSEMBLY

Hydraulic Motor Dis-Assembly Information:

1. Tools Recommended to Make Motor Repairs. The following is a recommended list of tools required to make repairs to the motor.

- **A.** Torque Wrench (34NM {300 in. lbs.} capacity).
- **B.** 300-400 mm (12-16 in.) breaker bar.
- **C.** 5/16"-12 point socket (heavy duty 56 nm {500 in. lbs.} capacity).
- **D.** Small Screwdriver (150 - 200 X 6 mm {6 - 8 X 1/4"} flat blade) that can be modified to do a particular function (see screwdriver modification Instructions later in this section of manual).
- **E.** 5 mm (3/16") Hex Key.
- **F.** Shaft Pressure Seal installation tool. **Eaton Co. Tool P/N 600523.**
- **G.** Seal Sleeve Installation Tool. **Eaton Co. Tool P/N 600304.**
- **H.** **Tools are Available by special order through the Eaton Co. Service Dept.**

2. Hydraulic Motor Schematic. Shown below is a breakdown of all the components that are in the motor assembly. Using the parts manual for part number listings this manual with the Operators manual and Parts manual should aid you to identify and repair the hydraulic motor. (See Figure 47). Note: some drawing may show 4 bolt square mounting flange, this is for illustration only motor will have a 2 bolt oblong flange as shown in later drawings.

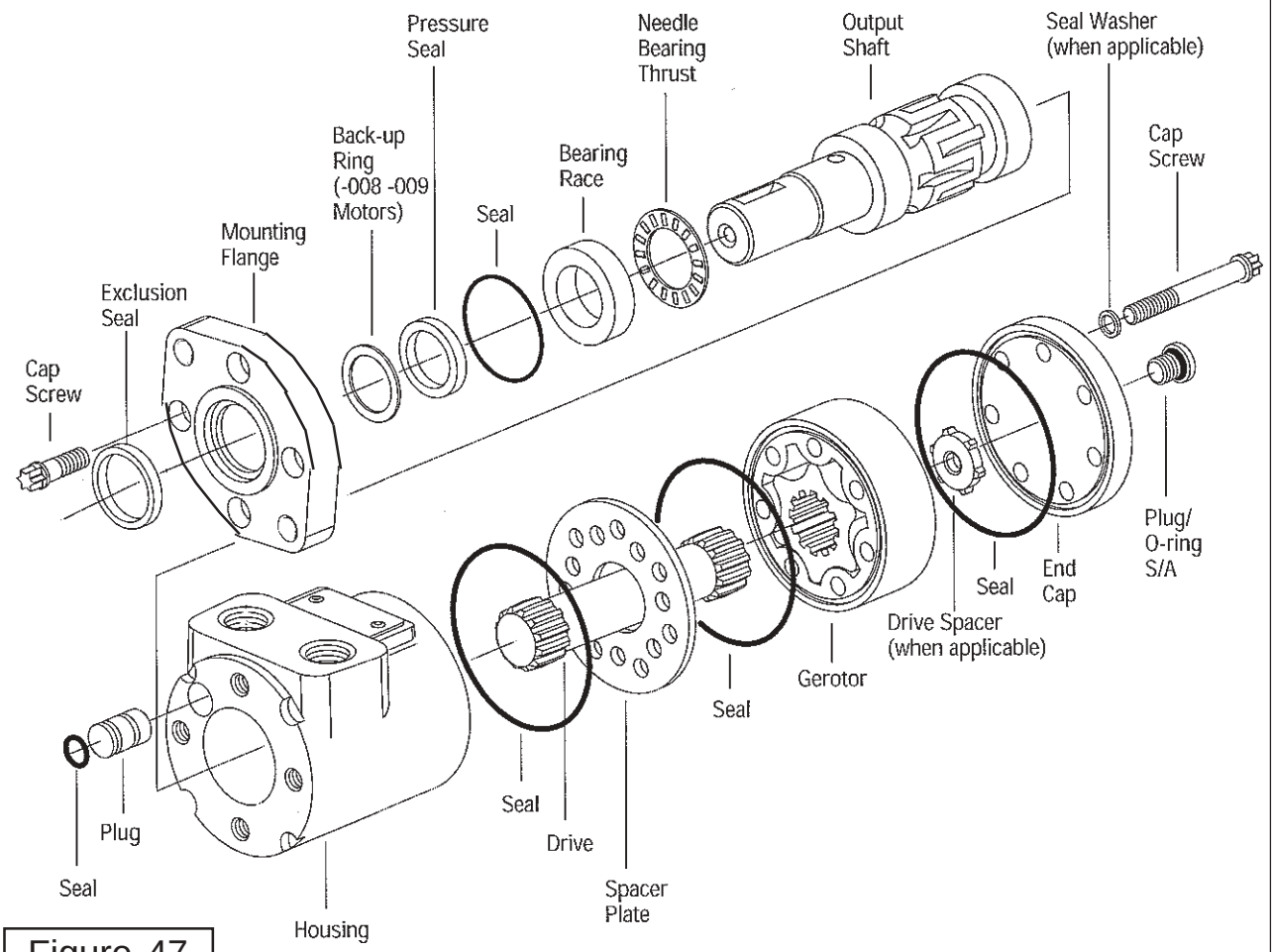

Figure 47

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MOTOR P/N 02974301 DIS-ASSEMBLY

3. Remove Motor From Drive Assembly. First lower the cutter bar to the ground until the cutter bar is resting on the ground. Clean the mower, motor and all hoses with fittings. Make certain there is not dirt or contamination on the unit that can get into the hydraulic system. Remove the two hoses that are connected to the motor, Cap the hoses and the fittings on the motor to keep them clean. Remove the motor cover to gain access to the two motor flange bolts. Remove the two flange bolts and this will allow the motor to pull up out of the drive assembly, make certain not to drop or loose the key from the motor shaft. The motor can be removed from the mower now and given good cleaning if needed, make certain the motor ports are plugged during cleaning (See Figure 48 & 49).

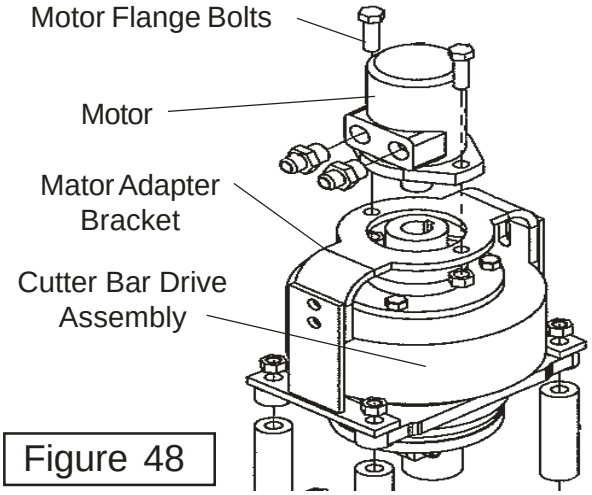

Figure 48

4. Clean All Components, Tools & Work Area. Cleanliness is extremely important when repairing any hydraulic component. Work in a clean area and with clean tools. Do not use rags that will leave lint or dust. Do not use solvents that are dirty or contaminated, use caution some solvents will damage rubber components. If solvent are used they must be thoroughly dried before any assembly work and clean parts should have the machined surfaces coated with clean (compatible) hydraulic oil.

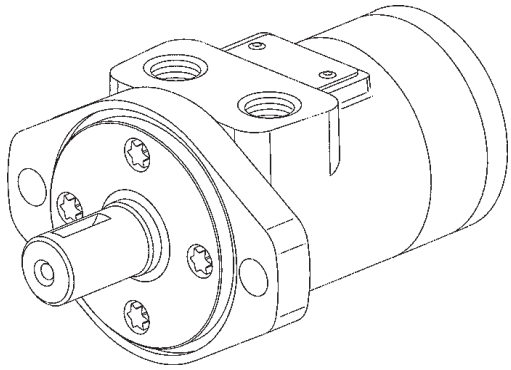
Figure 49

5. Clamp Motor In Vise. All drawings will not show the motor clamped in a vice, we recommend that you keep the motor in a vise during disassembly. The drawing may show a motor with a 4 bolt flange even though Alamo Industrial uses a two bolt flange motor, the 4 bolt flange is for illustration only and is not used by Alamo Industrial at this time. (See Figure 50) Clamp motor in vice, clamp across edge of mounting flange with output shaft down (See Figure 49). When clamping motor in vise, use protective device on vice such as special soft jaws, pieces of hard rubber or wood blocks to protect pump flange from damage.

6. Remove End Cap. The end cap is retained with seven bolts, they may have sealing washers amd they may not, check when removing bolts for these sealing washer. After the bolts are removed the end cap willl lift off of the body. There will be a sealing O-Ring under cap which will usually come off with the cap. If it does remove it from the cap (See Figure 51).

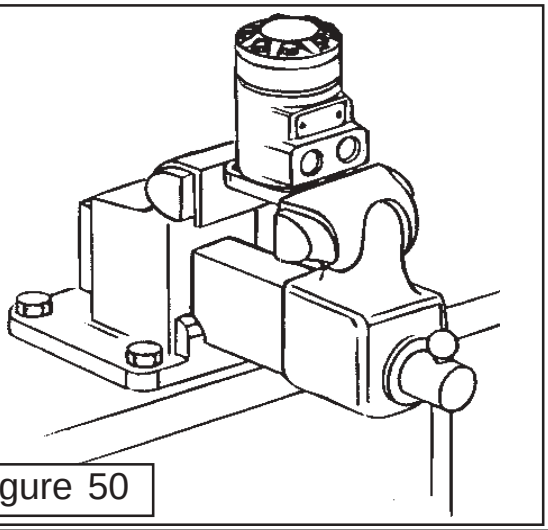
Figure 50

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MOTOR P/N 02974301 DIS-ASSEMBLY

7. Remove The Gerotor. Remove the drive spacer from the end (if used) and then remove the gerotor assembly by lifting up on it. There is a sealing O-Ring under the gerotor, remove the O-Ring it should have came off with the gerotor. Inspect the gerotor components for condition by removing the center component of the gerotor (See Figure 52).

8. Remove the Gerotor Drive Shaft. Pull the splined Drive Shaft out of the pump body, make note this shaft is splined on both ends. Make a note which way it came out. There is a spacer plate with holes in it that will be removed with the drive shaft and under the spacer is sealing O-Ring that will be removed (See Figure 53).

9. Remove the Output Shaft. First make certain key has been removed from the output shaft. To remove the output shaft remove the pump from the vice and turn it over to reclamp it into the vice, hold the shaft while doing this so it does not fall out the bottom (See Figure 54). Make certain not to clamp motor housing to tight and distort it.There is a needle bearing and a bearing race that should come out with the output shaft, if not pull them out from the bottom (See Figure 46 Parts break down and Figure 55). The Pressure seal and backup ring will stay in the mounting flange (See Figure 56)

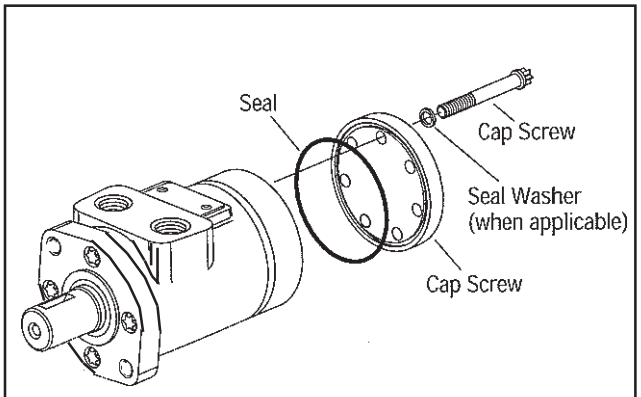

Figure 51

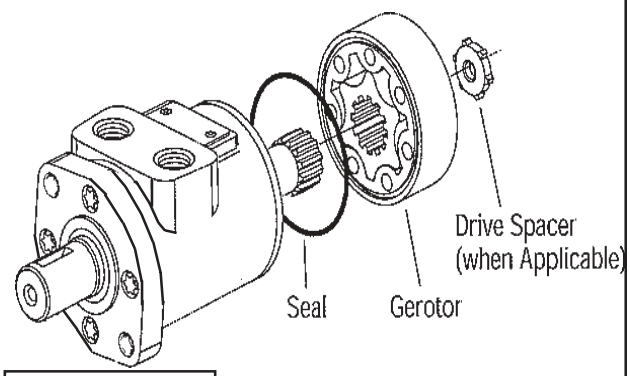

Figure 52

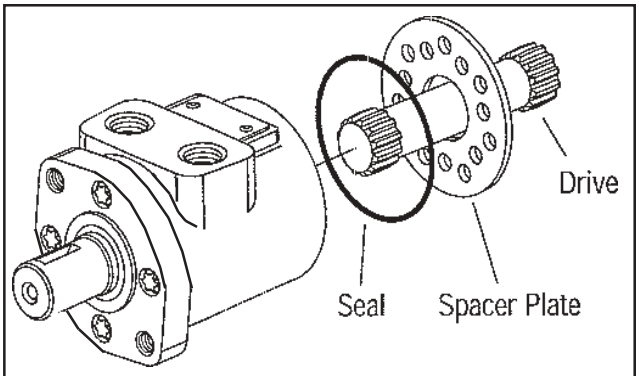

Figure 53

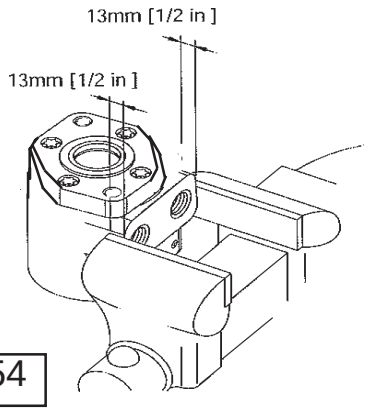

Figure 54

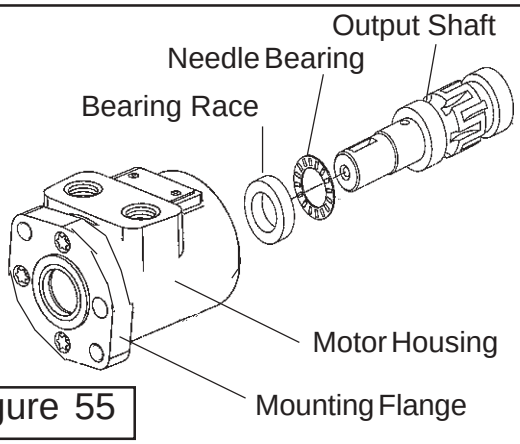

Figure 55

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MOTOR P/N 02974301 DIS-ASSEMBLY

10. Remove Mounting Flange. Remove the mounting flange by removing the four socket head bolts that bolt it to the motor housing, DO NOT Use an impact tool to remove these bolts as they are installed with locktite thread lock (See Figure 55). These bolts are installed with Locktite, if they are stuck use a propane torch as shown to heat the area where the bolts screw into the motor housing, this will soften the locktite and make it easier to remove bolts, it should only take 8 to 10 seconds for the locktite to heat up. The Bolts are tightened to 300 to 400 in. lbs of torque so it will take at least that much to remove them, gradually apply pressure on bolts to loosen them up. Note: once this heating is done the seals are may be damaged and need to be replaced, DO NOT use heat if you do not intend to replace the seals. The Pressure Seal, Backup Ring and Exclusion Seal will have stayed in the mounting flange . Figure 56 shows the seal removed but this is for illustrations only, they will have to be removed. The next steps will explain how to remove these seal.

11. Remove Pressure Seal, Backup Ring and Exclusion Seal. A tool to remove the seals can be fabricated from a flat tip screwdriver (See Figure 57). This will require bending and grinding the screwdriver tip. Use a file around the radius of the tip to make it as smooth as possible before using it. You want to make certain you do not scratch the ID of the seal seat cavity because a scratch can allow leakage around seal OD. Using the screwdriver that you modified stick the blade in from the out side and pry against the pressure seal and back up ring, use caution not to damage seal seat area (See Figure 58). Next use the screw driver to remove the exclusion seal from the mounting flange. Work from the outer side to remove both seals (See Figure 58)

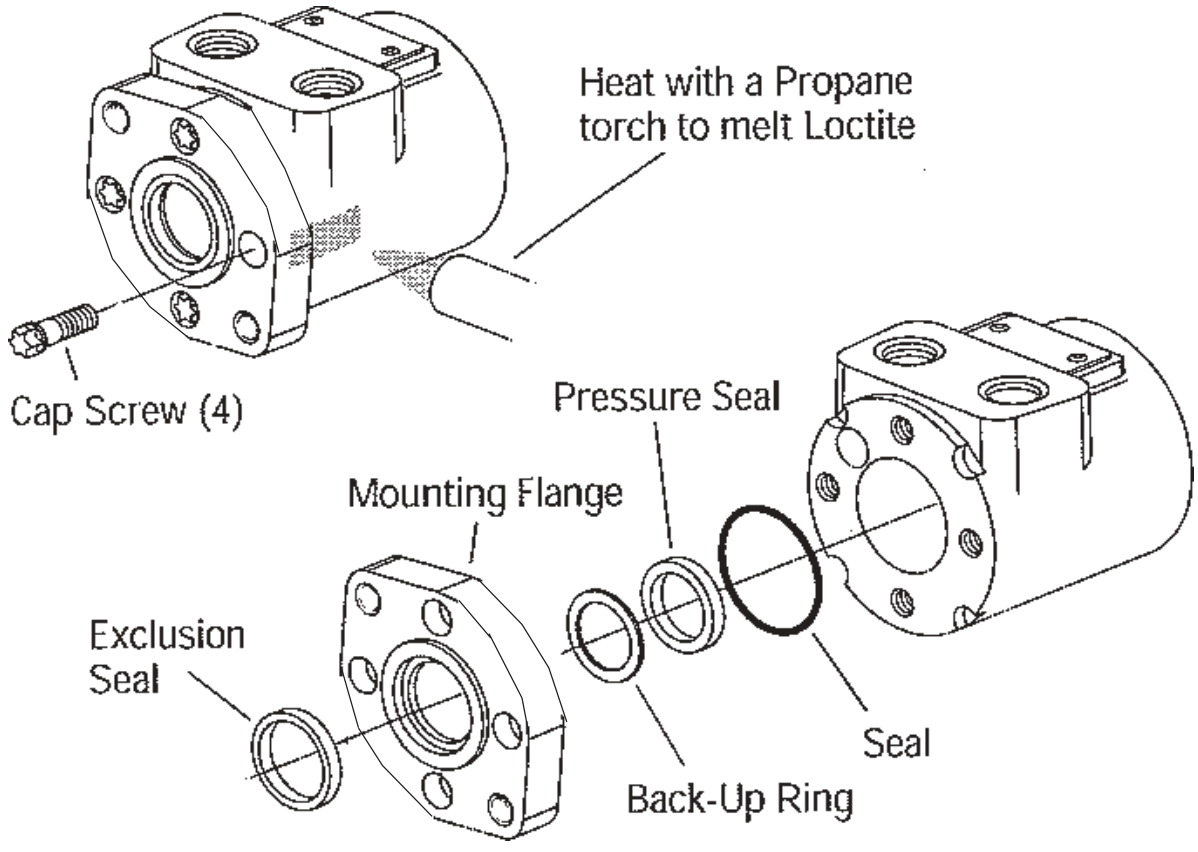

Figure 56

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MOTOR P/N 02974301 DIS-ASSEMBLY

12. Remove Plug & Plug Seal. Under mounting flange there will be a machined hole. There is a plug with seal in this hole, it should be removed for cleaning and replacing the seal. To remove the plug use a 3/16" hex Allen wrench. Insert the wrench into the port opening and the wrench will be behind the plug. Using the wrench push the plug out toward the front. Make certain that the seal is out and that the hole is clear.

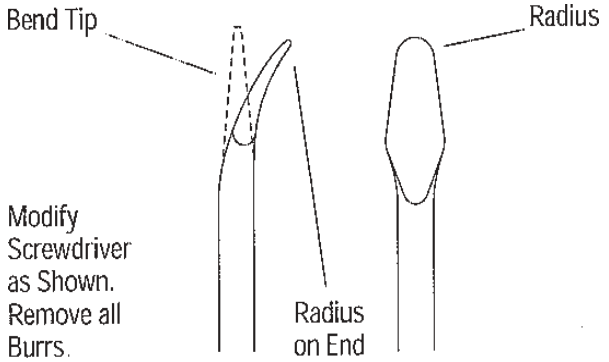

Figure 57

13 Inspect and clean all components. All the parts and components for the motor needs to be inspected and cleaned before any reassembly begins. Check the metal parts for wear or scratches. Clean all the parts with a clean solvent, DO NOT use rags or paper towels that will leave lint or dust. It works best to actually let the parts air dry. Inspect the parts once more after cleaning, replace any worn damaged parts. Parts can be coated with light coat of petroleum jelly to prevent the from rusting. Inspect the keyway in the output shaft for burrs or damage, this keyway cannot be cleaned up with a file. If keyway or motor parts need to be cleaned up it must be done with a hard smooth stone (Such as an Arkansas Stone) Never grind on motor parts. Do Not take away so much material that it makes the parts not fit together correctly.

NOTE: Fully cured locktite resist most solvents, oils, gasoline and kerosene and is not affected by cleaning operations. It is not necessary to remove cured locktite that is securely bonded in tapped holes; however, any loose particles of cured locktite should be removed.

After cleaning blow dry with compressed air, clean and dry tapped holes to make certain there is no solvent or debris in them.

Wire Brush the threads of the bolts to remove any cured locktite and other debris. Discard any bolts with damaged threads or heads. Wash bolts with non-petroleum solvent and blow dry.

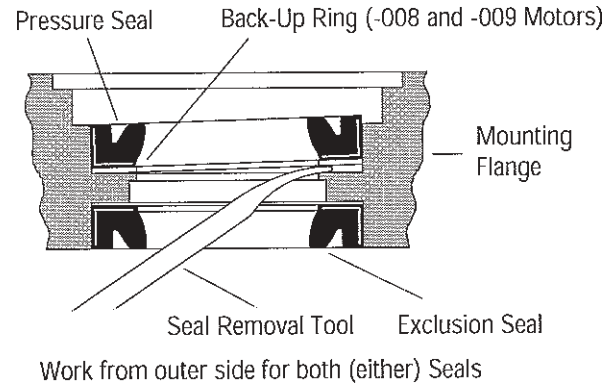

Figure 58

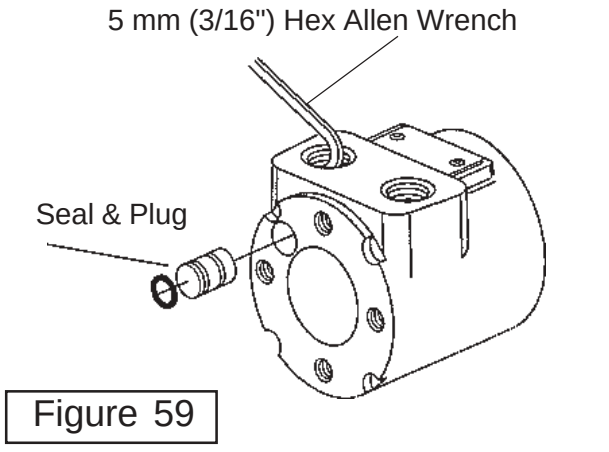

Figure 59

14. Replacement Parts. Use the Parts Manual Listing to order replacement parts for this motor. Make certain to order the seal kit. Always use new seals when installing new parts and coat the seals, bearing any other parts with petroleum jelly.

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MOTOR P/N 02974301 RE-ASSEMBLY

Hydraulic Motor Re-Assembly Information:

1. Install Plug & Plug Seal. The Plug and Seal are installed from the front of the motor housing. Lubricate the new plug seal and install it on the plug. Some plugs have two O-Ring grooves but require only one O-Ring. Install O-Ring Seal in the groove closest to end of plug. Push plug into motor housing so plug so plug and housing are flush. Be careful not to damage O-Ring Seal when doing this (See Figure 60)

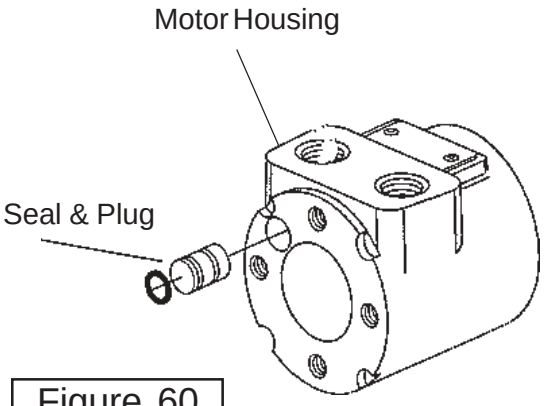

Figure 60

2. Install Output Shaft in Motor Housing. Lubricate the output shaft in the two wear areas (See Figure 61). The Output shaft will slide down into the motor housing without force.

3. Install Needle Bearing & Bearing Race on Output shaft. Install the needle bearing down over the output shaft and down into the motor housing. In some cases it is easiest to pull the output shaft out of the motor housing a short distance and push the bearing and race down over the shaft. Then push all three items into the motor housing together (See Figure 61). The Bearings race must rotate freely when in position, check this now, if it does not something is wrong. Remove parts and find out what is wrong.

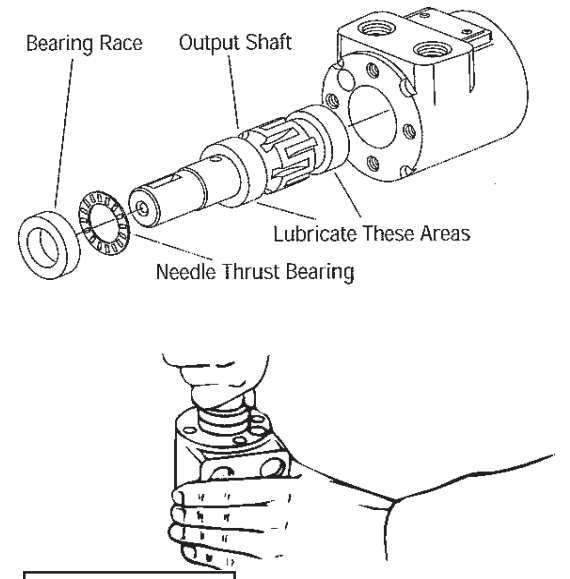

Figure 61

4. Install Exclusion Seal in Mounting Flange. The first thing that needs to be done is inspect the seal seating surface of the mounting flange. Look for any scratches or burrs are the seal seat, make certain that there are no sharp edges around the top of the cut for the seal area, if there is it will cut the OD of the seal when it is installed and it will leak. Install the Exclusion seal by pressing it in from the outside of the mounting flange making certain the seal is installed in the correct direction (See Figure 63).

5. Install Back-Up Ring & Pressure Seal. Use the Seal installation tool (Eaton P/N 600523). Lubricate ID of seal tube and OD of Pressure Seal with light film of clean petroleum jelly. Align small ID end of seal tube with seal seat in mounting flange. Install Back-Up Ring and pressure seal in tube with lips of seal face up (See Figure 63). Insert Seal Driver in tube and firmly push seal seat with rotating action. IMPORTANT: after installing seals in flange examine condition, if damaged or improperly installed, you must replace them before continuing with assembly (See Figure 63)

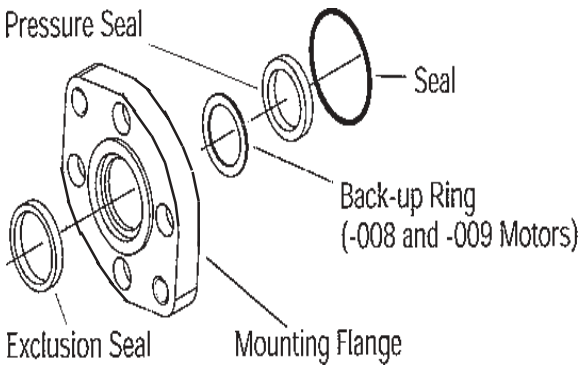

Figure 62

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MOTOR P/N 02974301 RE-ASSEMBLY

6. Install O-Ring Seal. Install the 48 mm ID round seal into flange mounting groove. Coat with a light film of clean petroleum jelly (See Figure 62). Do Not Streatch round seals before installing them, if you do they will not fit.

7 Use Locktite Primer for Mounting Flange Mounting Holes. If Shaft , Needle Bearing and Bearing race are installed correctly the bearing race should be partially in motor housing and partially rising above motor housing (See Figure 64 & 65) Inspect the threaded holes in the motor housing, make certain they are clean and dry. It is recommended to apply a light coat of locktite primer NF in tapped holes of motor housing (See Figure 64). Allow primer to air dry for at least 1 minute. Do not force dry with air jet, the primer will blow away.

Use of primer is optional. With primer, locktite curing time is approximately 15 minutes. Without primer curing time is approximately 6 hours.

8. Apply Locktite To Motor Housing. Apply 3 or 4 drops of locktite sealant at top of threads for each of the four threaded holes in motor housing (See Figure 64). Do not allow parts with locktite applied to come in contact with any metal parts other than those for assembly. Wipe the excess locktite from motor housing face, using a non petroleum base solvent.

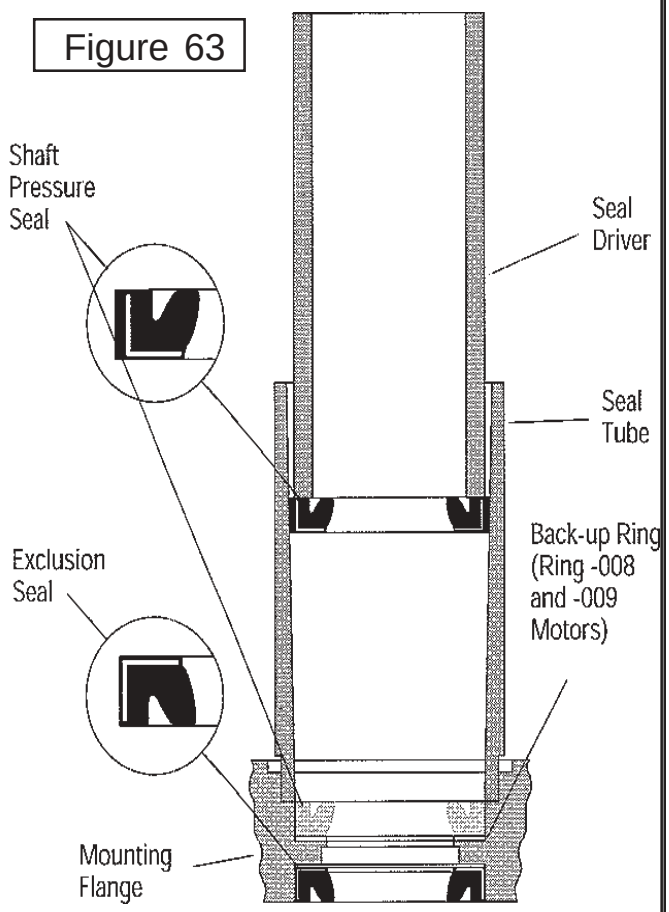
Important: Do Not apply locktite to threads more than 15 minutes before installing bolts. If motor housing stands for more than 15 minutes, repeat application. No additional cleaning or removal of previously applied loctite is necessary.

9. Install Mounting Flange to Motor Housing. Before installing flange to motor housing coat the shaft with and the ID of the seals in Mounting Flange with petroleum jelly (See Figure 65). Also coat the round 49 mm ID seal with petroleum jelly, this is the seal that will seal around the bearing race and seal flange to housing (See Figure 65)

Install Flange, rotate flange slowly while pushing down over shaft. Be careful not to invert Seal ID or damage seals.

Inspect to make certain the flange is seated on motor housing and the four bolts holes are aligned.

Figure 63



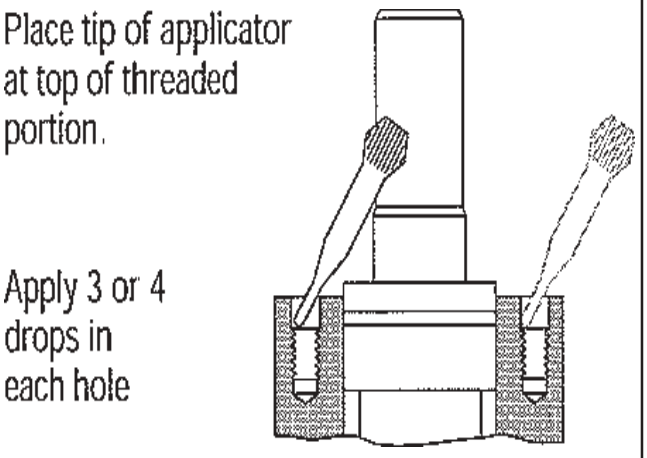


Figure 64

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MOTOR P/N 02974301 RE-ASSEMBLY

10. Install Mounting Flange Mounting Bolts. Make certain the Bolts are clean and dry. If new bolts are used make certain they are the correct length, match them with the old bolts or make certain the **thread length does not exceed 22 mm (.875 in.)** . See Parts Manual for correct replacement part number.

Re-Clamp motor in vise (See Figure 66) as shown. **MAKE CERTAIN** Shaft does not fall out the bottom. Install the four bolts dry, alternately from one side to the other tighten the bolts a little at a time to keep the flange square until you have tighten then to **250 in. lbs. (28 nm) of torque.**

11. Reposition Motor in Vise With Gerotor End Up. Re-clamp motor in vise with output shaft down (See Figure 50).

12. Fill Motor Cavity wit Oil. With the motor in the vise with gerotor end up pour proximately 35 CC of clean hydraulic oil in output shaft cavity.

13. Install Housing Seal & Spacer Plate. The housing seal will fit into a groove in the motor housing, the seal should have ID of 73 mm (2.875 in.). coat the searing with oil or petroleum jelly. The Spacer ring will fit down over the seal ring, the bolt holes in the spacer plate must be aligned with the bolt holes in the motor housing (See Figure 67).

14. Install Gerotor. The Gerotor must be timed with the output shaft in order for the motor to start in the correct rotation when engaged. The motor is set to be what is considered standard rotation.

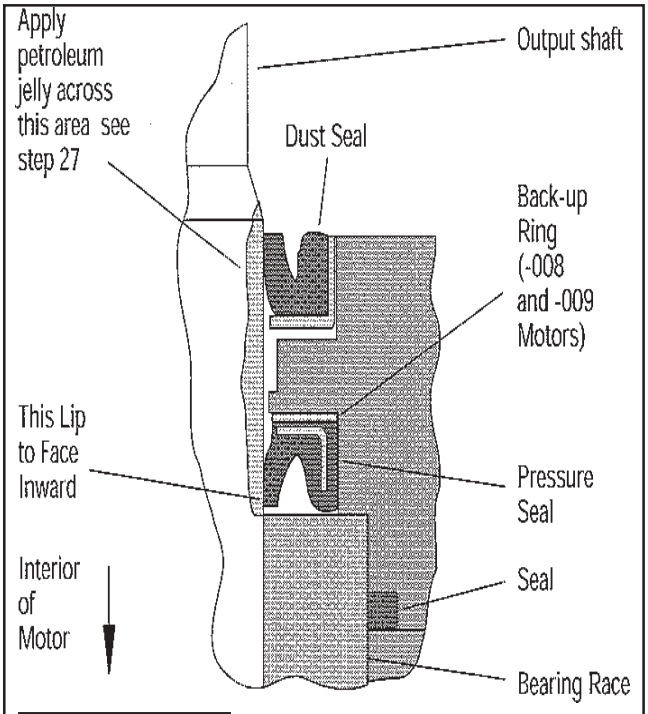

Figure 65

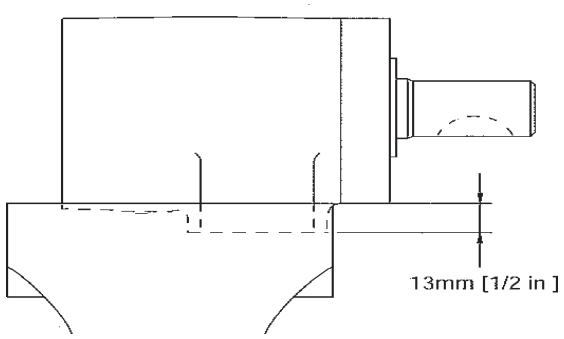

Figure 66

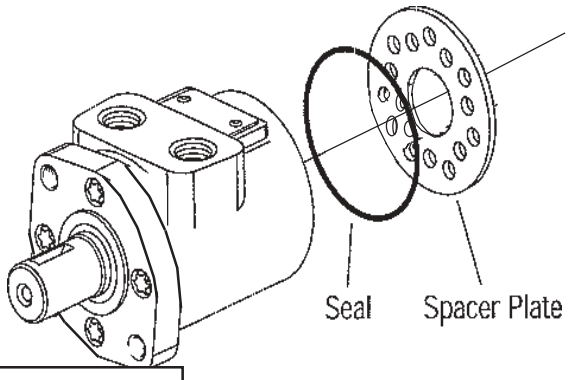

Figure 67

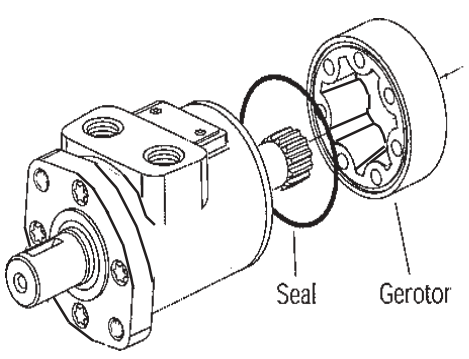

Figure 68

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MOTOR P/N 02974301 RE-ASSEMBLY

15. Timing Gerotor. To time the gerotor with the output shaft. Find the timing dot on the output shaft (See Figure 69) , draw a straight line across the out put shaft with the felt tip marker (See Figure 69). Put a (Ink marker) mark across the inner star part of the gerotor and the OD of the gerotor when the star is aligned with one tooth of star in valley and opposite one pointin to the high mark of gerotor (See Figure 69) These will become the timing marks.

Make certain the round seal is installed between gerotor and the spacer plate (See Figure 68). Seal should be coated with clean oil.

Slip the gerotor and star down onto the output shaft splines, make certain the mark across the input shaft, the mark across the gerotor and the mark across the inner star are aligned as shown (See Figure 69)

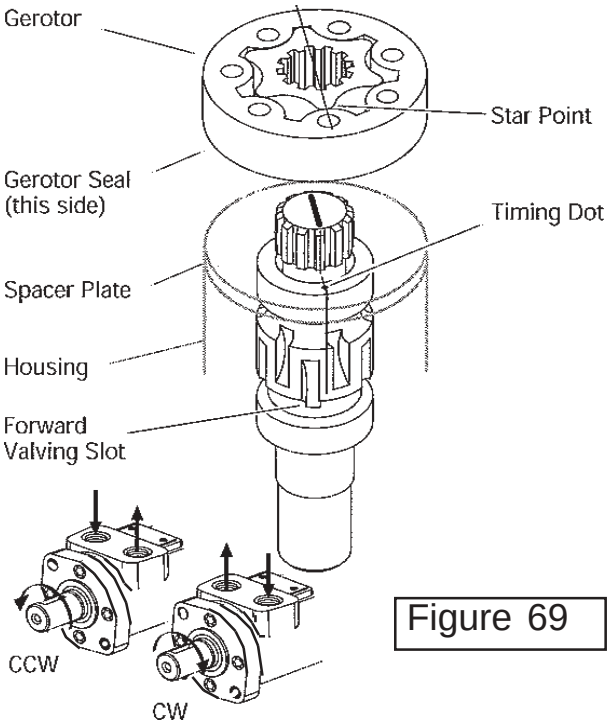

Figure 69

16. Install Drive Gerotor Star End Spacer. If used install the drive spacer into the splined ID of the star in gerotor, Some Pump may not use this spacer. If the motor had a spacer (See Figure 52 & 70) then it needs to be reinstalled.

17. Install Motor End Cap and Seal. The end cap is installed with a round ring seal 73 mm ID (2.875 in.) inserted into a groove in cap (See Figure 70). Rotate gerotor to align bolt holes in gerotor with bolt holes in spacer and motor housing. Set the end cap down onto the gerotor aligning the bolt holes. Some bolts will have seal washers on to them, if they were on bolts when removed put them back on. Start all the bolts (7 Bolts) into the end cover but do not tighten them. These bolts will have to be torqued and done in a cross pattern (See Figure 71) in stages. Tighten to 7.4 nm (40 in. lbs). Check to make certain seal washer are properly seated. Next torque bolts to 27-28 nm (235 to 250 in. lbs) following the pattern shown (See Figure 72).

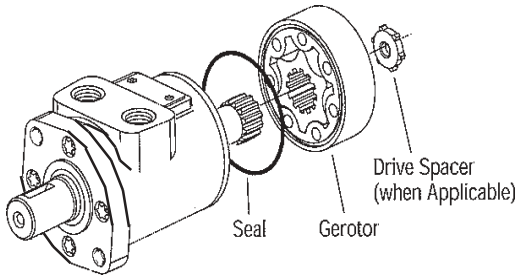

Figure 70

18. Re-Install Motor to Drive Assembly. Install the motor to drive asy with same 2 bolts you removed. connect hoses as they were removed.

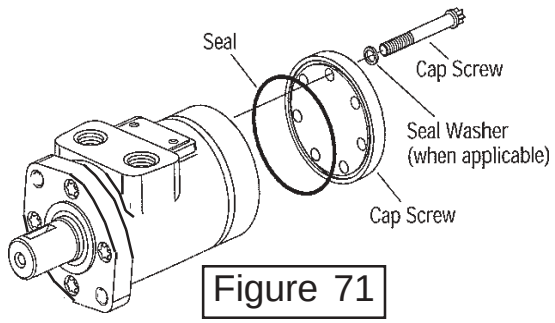

Figure 71

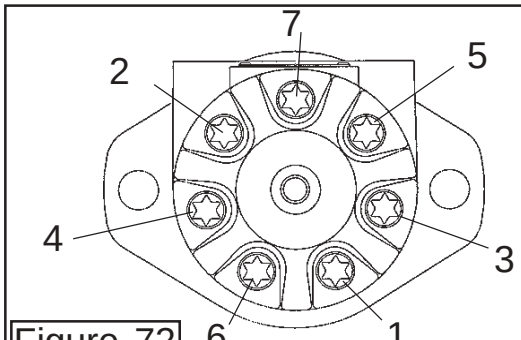

Figure 72

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Section 5

Pump Repair

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PUMP ASSEMBLY REPAIR

INTRODUCTION:

The information in this Section of Book is reprinted with Permission of the Pump Manufacturer. This Section of Book provides service information for the Gear Pump. Step by Step instructions for the complete disassembly and reassembly of the Pump are given. In Most diagrams there are no Component Part Numbers Listed, Only Item numbers and Descriptions, This is because most parts shown as breakdown in drawings are for location & identification only and may not be available as replacement parts. NO Dirt at all should be around Parts during repairs.

BEFORE STARTING REPAIRS: Service Rules (READ THIS)

1. Remove Front Cover. Clean Pump and surrounding area completely before removing any connections or Lines. NO DIRT OR DEBRIS CAN BE ALLOWED ON OR NEAR HYDRAULIC SYSTEM IF IT IS BEING WORKED ON, ANY DIRT OR CONTAMINANTS IN SYSTEM NO MATTER HOW SMALL WILL DAMAGE SYSTEM!
2. After cleaning around all connections thoroughly, Disconnect all connections, Lines, Hoses, Wiring and Remove the Pump Completely from the Tractor. Plug all hoses and Lines on Tractor and on Pump, DO NOT leave any open Lines. NO Contamination Should be allowed into system at all.
3. Clean Area, Clean all Tools, Pans etc. The cleaning of Area and Tools MUST be done before moving (Cleaned) Pump there. Drain Oil from Pump, Recheck outside of Pump to Make Sure it is Clean
4. After disassembly of Pump wash all metal components in clean solvent.
5. Use compressed Air to dry parts after washing (Compressed air must be filtered and moisture free). DO NOT wipe them dry with Paper Towels or Cloth as these will leave lint and/or dust contamination. DO NOT USE Compressed Air to spin any component (Such as Bearings or Plates) as this will damage them and could be dangerous.
6. Always use new Seals when reassembling Hydraulic Pumps, Lubricate the new rubber Seals with a Petroleum Jelly, (Vaseline) before installing them.
7. DO NOT reinstall worn or damaged Parts back in Pump, DO NOT Use a worn or damaged Pump Housing.
8. Torque all Bolts over Gasket Joints. Then repeat the Torque sequence to make sure Bolts are tight, some times Gaskets can give a Torque reading that is OK but is not, so always recheck Torque.
9. Verifying the accuracy of Pump Repairs on an authorized test stand is essential.

RECOMMENDED TOOLS:

1. Retaining Ring Pliers
2. O-Ring Pick (Qty 1)
3. End Wrench (Qty 4), 1 each of 7/16", 9/16", 3/4", 1"
4. Torque Wrench (Qty 1), 0 to 1200 in. lbs.
5. Hammer, Soft Face (Qty 1)
6. Seal Driver Set (Qty 1)
7. Socket Set (Drive Size should match Torque Wrench Drive)
8. Light Petroleum Jelly (Vaseline)
9. Locktite, # 222 and #277 or equivalent (Qty 1 tube each)

NOTE: This is a tandem pump, the outer pump housing (the smaller pump gears) is the hyd cyl supply and the inner pump (larger pump gears) is the motor supply. There is only one suction port on pump, both sections of pump will use this one suction port and hose.

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HYDRAULIC DIAGRAM - SINGLE RH WING

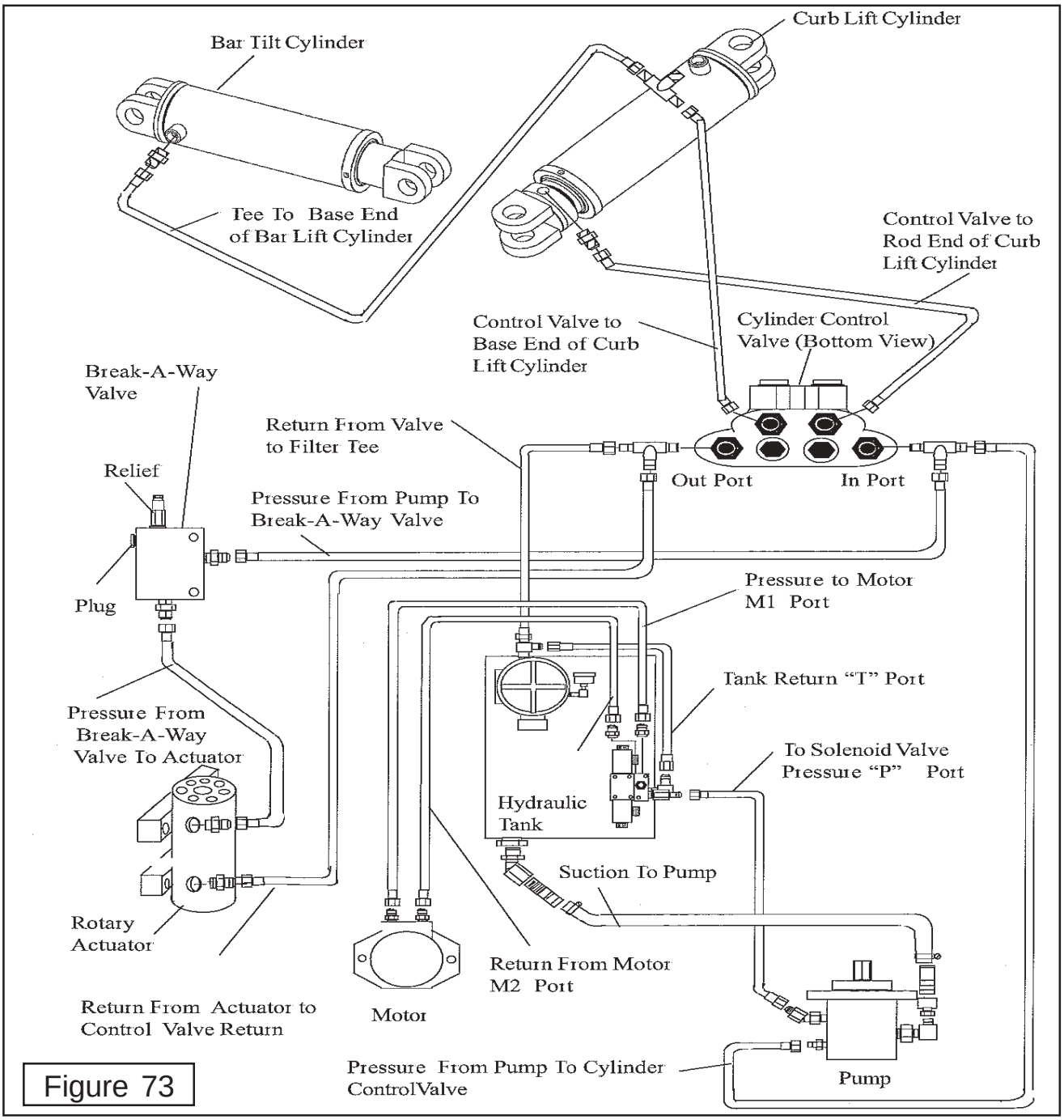
Curb Lift Cylinder
Bar Tilt Cylinder
Tee To Base End of Bar Lift Cylinder
Control Valve to Rod End of Curb Lift Cylinder
Control Valve to Base End of Curb Lift Cylinder
Cylinder Control Valve (Bottom View)
Break-A-Way Valve
Return From Valve to Filter Tee
Relief
Out Port
In Port
Pressure From Pump To Break-A-Way Valve
Plug
Pressure to Motor M1 Port
Tank Return "T" Port
Pressure From Break-A-Way Valve To Actuator
To Solenoid Valve Pressure "P" Port
Hydraulic Tank
Suction To Pump
Rotary Actuator
Return From Motor M2 Port
Return From Actuator to Control Valve Return
Motor
Pressure From Pump To Cylinder ControlValve
Pump

Figure 73

Hydraulic Hoses:

Most of the hydraulic hoses will vary in length and part number, this is because when mounting units on different tractors will require different length hoses (See Figure 1). When the unit was shipped it should have been shipped with assembly instruction sheets and/or assembly manual which should list the hose part numbers that apply to the application. Retain these records for future use in ordering parts. NOTE: Do not use Teflon Tape on any hydraulic fittings, use only liquid sealer on NPT fitting and only on the OD of fitting never the ID.

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HYDRAULIC DIAGRAM - DUAL LH WING

Shown below is the Hydraulic Diagram for the Dual Wing Model

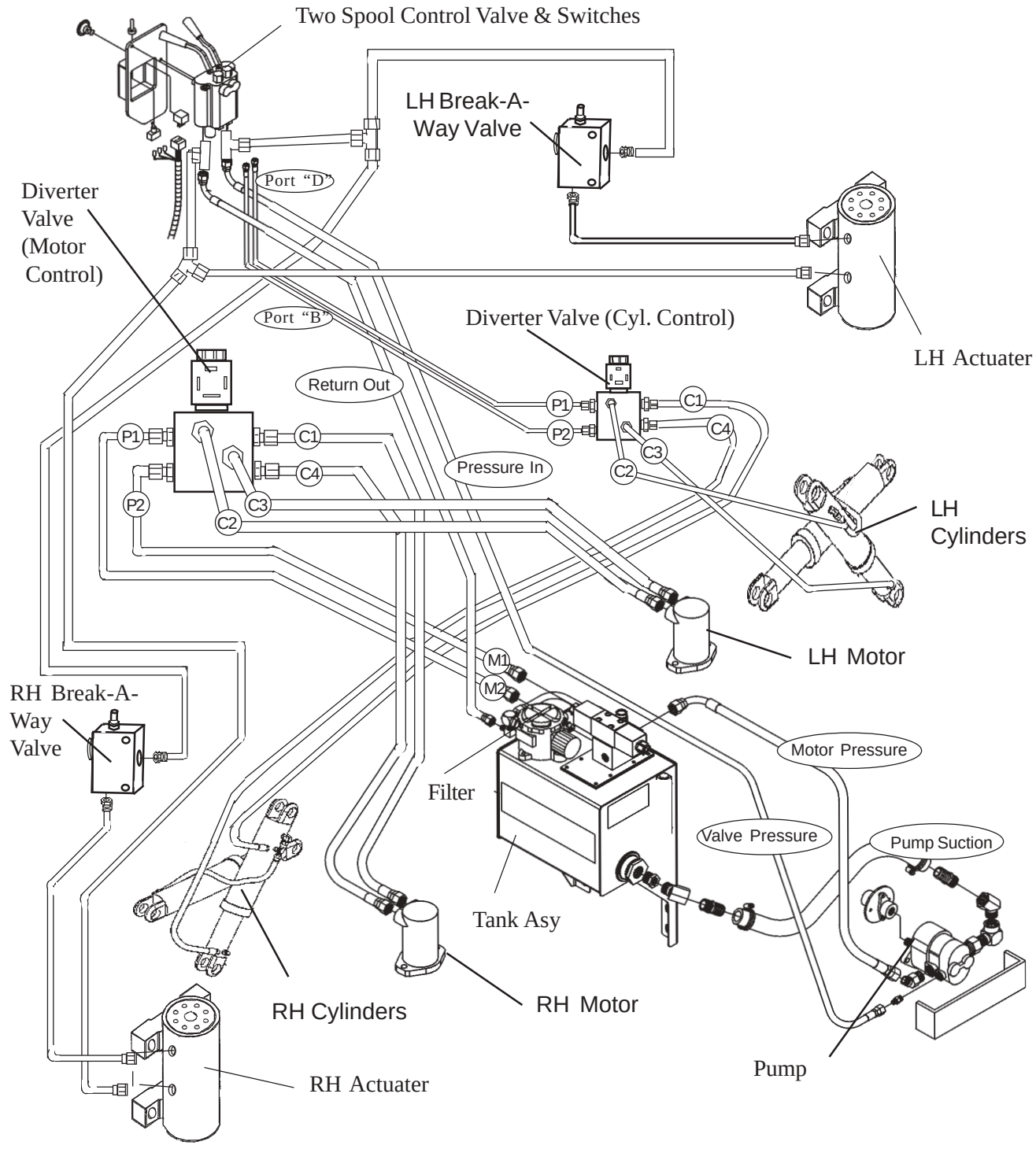

Figure 73A

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PUMP ASSEMBLY IDENTIFICATION

Pump Identification:

There are different ways to identify the type and size of the pump that you have. The disassembly and assembly of the pumps will be basically the same they will have parts that can not be interchanged.

The Switch Blade had 3 different pumps used (See Figure 75).

* P/N 02974302 (1.16 / 0.49 Cu In / Rev)
  "A" = 5-3/16" "B" = Steel "C" = Steel
* P/N 02974302A (1.16 / 0.49 Cu In / Rev)
  "A" = 5-1/8" "B" = Alum "C" = Alum
** P/N 02974303 (0.98 / 0.37 Cu In / Rev)
  "A" = 4-7/8" "B" = Steel "C" = Steel
** P/N 02974303A (0.98 / 0.37 Cu In / Rev)
  "A" = 4-3/4" "B" = Alum. "C" = Alum

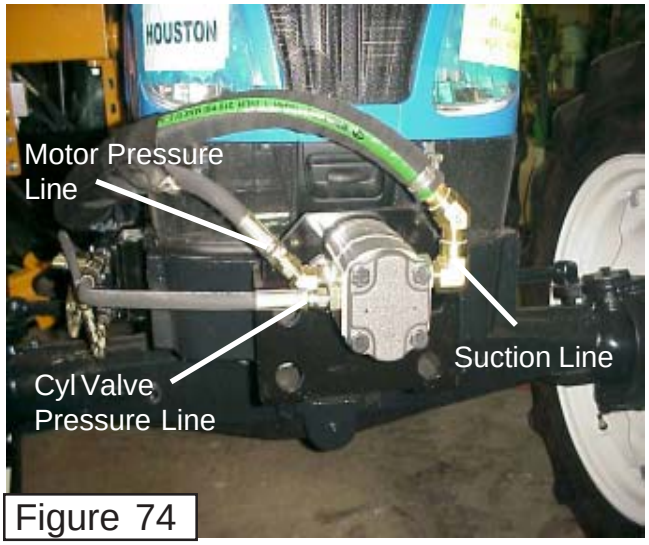

Figure 74

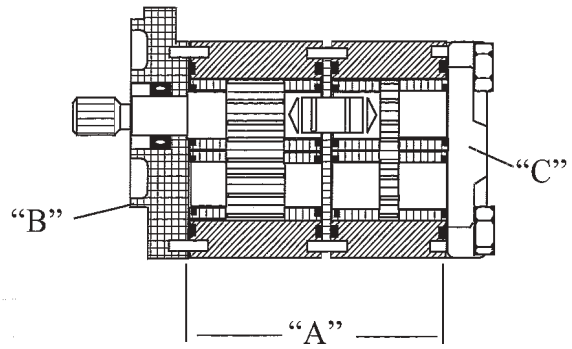

Figure 75

* As of this date pump P/N 02974302A has not been used in production and is not scheduled to replace P/N 02974302 until approximately 2006, but it will replace the pump eventually.

** As of S/N SWB6- 10362 (10/04) P/N 02974303 has been replaced by P/N 02974303A. These pumps can be identified by the flange and end caps steel or aluminum construction also the length of the gear housings when pump is assembled (See Above & Figure 75).

Always ID which pump you have, most parts will not interchange between these pumps and which pump you have will depend on which tractor you have and the manufacture date of the unit.

To identify the Cubic Inch displacement of the pump check the dimensions shown above. The larger 1.16 pump should have been installed on tractors that require an engine speed of 2139 RPM or less to produce 540 RPM at the PTO. The Smaller 0.96 pump should be used on tractors that require an engine speed of 2140 RPM or higher to produce 540 RPM at the PTO. Check with the tractor specifications to determine what engine speed is required to produce 540 RPM PTO speed.

The Suction side and the pressure side must be assembled as shown (See Figure 74). Do not reverse the rotation of the pump when reassembling it.

SUMMARY: Pump Identification. Check the length of the gear housings (include middle spacer in length) when pump is still assembled, this "A" length. Check the type material the mounting flange is constructed out of, Aluminum or steel, this is "B" designation. Check the type material the End Cap is constructed out of, Aluminium or steel, this is "C" designation (See Figure 75). Check the engine speed (RPM) required to produce 540 RPM at the PTO shaft as to which pump should be used (See Above)

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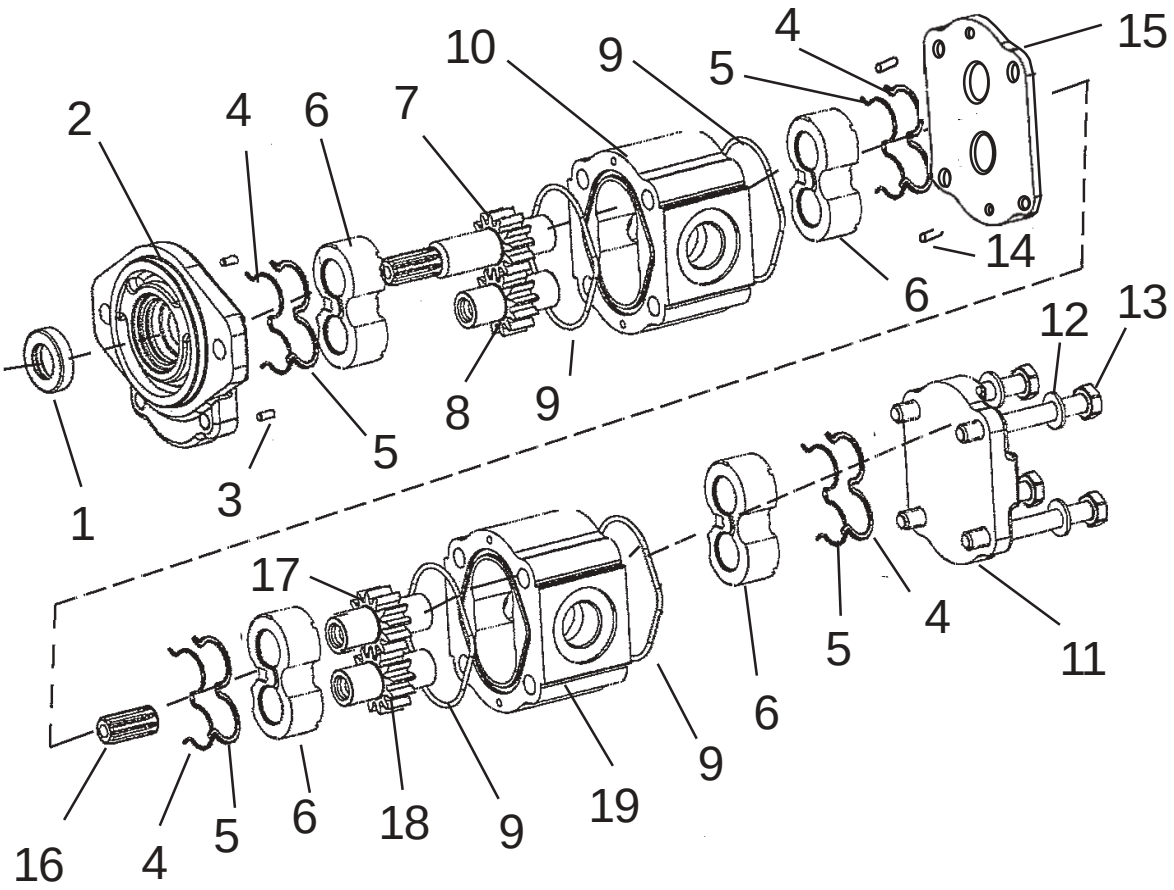
PUMP SCHEMATIC



Item	Qty	Description
1.	1	Lip Seal
	1	Snap Ring
2.	1	Mounting Flange
3.	2	Dowel Pin (Short Pin)
4.	4	Back-up Seal, Plastic
5.	4	Channel Seal, Rubber
6.	4	Thrust Block
7.	1	Drive Gear, (large Gear Section)
8.	1	Driven Gear, (Large Gear Section)
9.	4	O-Ring Seal
10.	1	Gear Housing, (Large Gear Section)
11.	1	End Cap
12.	4	Sealing Washer
13.	4	Tie Bolts
14	2	Dowel pins (Long Pin)
15.	1	Middle Spacer Plate
16.	1	Connecting Shaft
17.	1	Drive Gear (Small Gear Section)
18.	1	Driven Gear (Small Gear Section)
19.	1	Gear Housing (Small Gear Section)

Figure 76

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PUMP DIS-ASSEMBLY

Remove Pump From Tractor:

To remove the pump from the tractor. Drain the Hydraulic Oil Tank of oil (See Figure 77). The tank has been mounted in different places depending on which tractor is used. Shown here is only one mounting application and may not be where the tank is mounted on your tractor.

DO NOT disconnect any hoses or fittings until the surface around them has been cleaned and all drain / catch pans are in place.

To drain the hydraulic tank, the oil can be pumped out of tank (See Figure 77) or drained out through the suction hose at the pump (See Figure 74). The decision how to remove the oil is up to the repair technician. When draining the oil it must be kept in mind, the oil can not be contaminated by any debris or other chemical such as something that was used it the catch container previously. Dirt or trash that is on the exterior of the pump or hoses that will get in oil as it is drained over it. If the oil is not to be reused it will not matter. Caution must always be taken when removing oil not to allow the oil to be spilled around working area. Make certain the old oil is disposed of in the proper way. Cap / Plug all hoses and fitting when they are disconnected.

Figure 77

Disconnect the hoses from the pump after the oil has been removed. The pump is mounted to the pump mounting flange with two bolts. (See Figure 74). The pumps splined shaft will be into a splined coupler that is on the driveshaft, driveshaft will vary with tractor model used. The pump should slide out of the coupler , in some cases the coupler will slide off of the driveshaft and stay on pump shaft. If it stayed on pump shaft you should remove it and reinstall it onto the driveshaft. Use suitable puller if coupler is stuck on pump shaft, DO NOT use hammer to remove coupler. NEVER use hammer on pump shaft, if you do you will damage the internal components of the pump.

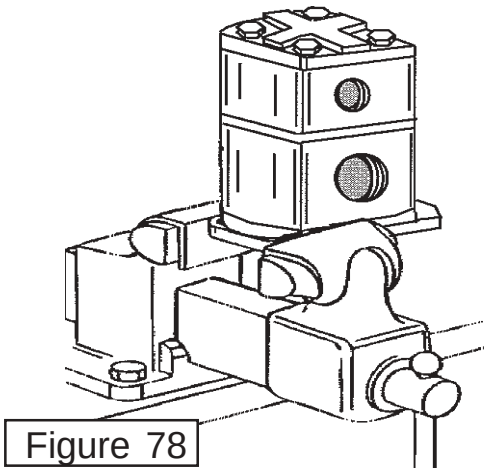
Figure 78

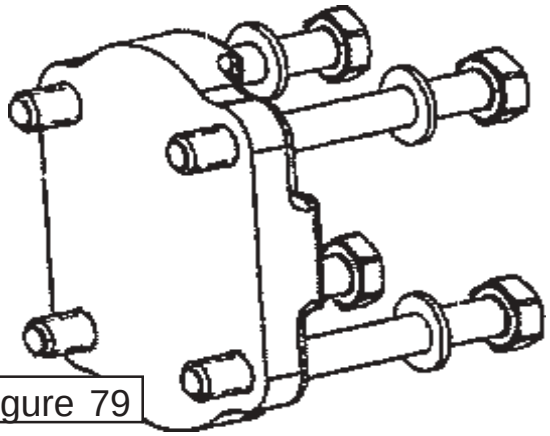
Figure 79

Pump Dis-Assembly:

1. Clamp the Pump in a vise, use caution not to damage the flange (See Figure 5) but make certain the pump is straight up with the shaft pointing down. Make certain pump is securely clamped in the vise. DO NOT clamp pump in vise by the machine pilot ring on mounting flange, it could be damaged. NOTE the type and orientation of all seals before and during disassembly as they must be replaced in the same orientation as removed. DO NOT hit the pump components or the input shaft with a hammer, it will damage them. The gear housings are assembled with dowel pins, the use of a soft (rubber) Mallet can be used to break the gear housing loose by tapping them on the side.

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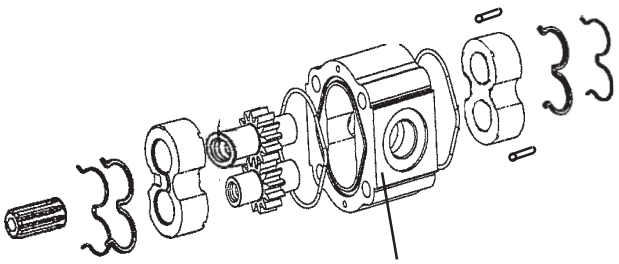
PUMP DIS-ASSEMBLY

2. Remove the four tie bolts that retain the end plate on (See Figure 78 & 79). Before you remove the tie bolts mark the gear housing, end cap center spacer and mounting flange on one side. These marks will help in the reassembly to align the components the same as they came off. When removing tie bolts and lifting end cap off, use caution as the gear housings are only held together by the gears now.



Outer Pump Housing Section, Small Gear Set

Figure 80

3. Lift End Cap off of pump. Remove the four tie bolts (See Figure 78 & 79). Make certain that you hold down on the gear housing when removing the end cap. The end cap will use dowel pins to align the end cap with the gear housing, It may require you to wedge something between end cap and gear housing too remove the end cap. Some dowel pins will stay in gear housing or end cap, these do not have to be removed but you must remember this when reassembling pump.

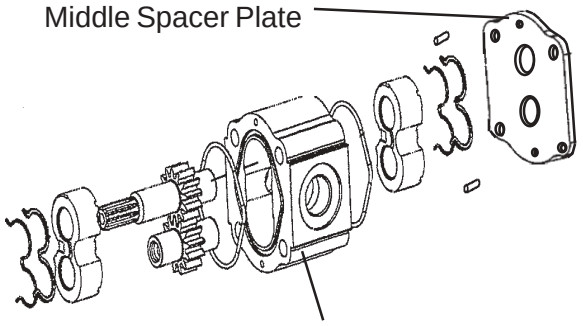


Figure 81

Inner Pump Housing Section, Large Gear Set

4. Remove Small Gear Housing and components (Outer Pump Housing). When removing the gear housing off of the small outer side be prepared to catch parts if they fall. When lifting the gear housing up the gears and thrust block may or may not try to come off with it, if they do this is OK as they can be removed from the housing. USE caution to make certain none of the thrust blocks or gears do not fall to the floor as they could be damaged. Make a note on the way the thrust blocks are installed as they must be installed the same way when reassembled. The gear housing is connected to the middle spacer plate and other gear housing with dowel pins, the sections may have to pried apart, if you do you must be very cautious not to damage the gear housing (See Figure 76 & 80)

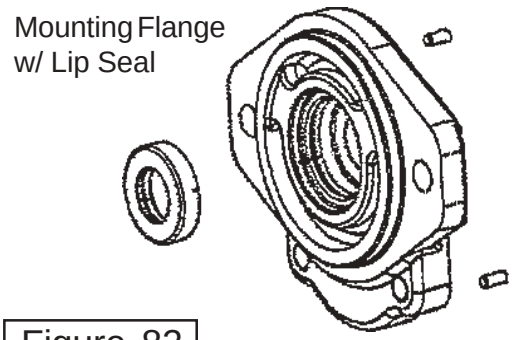


Figure 82

5. Remove Stub Connecting Shaft. The stub connecting shaft is used to connect the rear set of gears to the front set of gears. This is a stub shaft that will pull out of the drive gears (See Figure 76 & 80). If the stub shaft is left in the front drive gear it will be OK.

6. Remove Large Gear Housing and Components (Inner Pump Housing). The Inner gear / pump (large gear) housing will lift off but the middle spacer should be removed first. It will lift away from gear housing. Make certain that the gears and thrust blocks do not fall out when removing the inner housing, If the gears come out with the housing this will be OK, just make certain you catch them and do not drop them. (See Figure 76 & 81)

7. Mounting Flange, The mounting flange will be all that is left in the vice, The lip seal will be removed from the outside, if there is a snap ring it will need to be removed first then the seal. The seal will drive out. Do Not damage seal seat area. (See Figure 76 & 82).

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PUMP RE-ASSEMBLY

Pump Re-Assembly:

1. Clean and Inspect All Components, Clean the components using a non petroleum based solvent. Let the parts air dry or used pressured air to dry them. DO NOT use rags or towels that will leave lent on parts. All parts must be kept clean during assembly, all tools and work area must remain clean. After parts are cleaned if they are not to be assembled right a way coat the parts with clean new hydraulic oil to prevent any rust.

2. Install New Lip Seal Into Pump Mounting Flange. Inspect the seal seat area in mounting flange, make certain there are no scratches or burrs in seal seat area. Press the new seal into the mounting flange with the lip seal garter spring facing toward the inside. Press seal in until it is seat against the inner ridge of seal seat. If pump has a snap ring reinstall it into the seal opening and against the seal now. (See Figure 83). Coat the ID of seal (Shaft Run Area) with light grease or Petroleum Jelly to lube seal on start up.

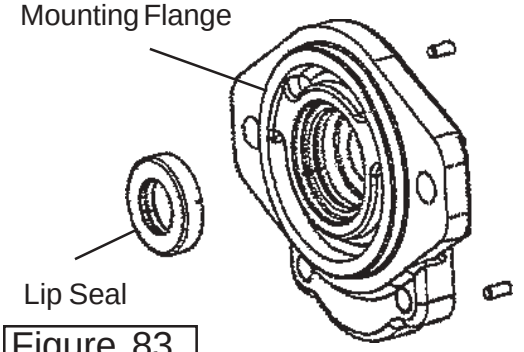

Figure 83

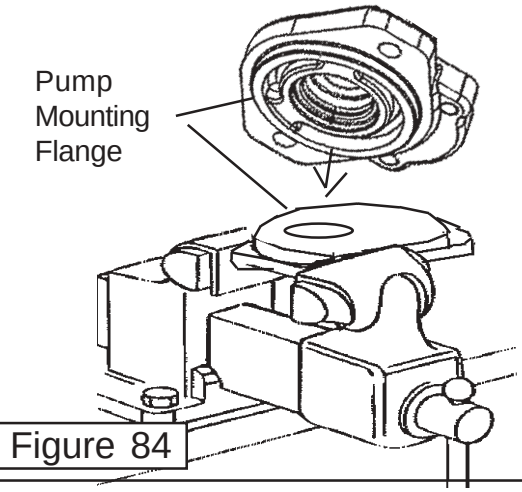

Figure 84

3. Clamp Pump Mounting flange in Vise, use caution not to damage the flange (See Figure 84) but make certain the pump mount flange is straight up with shaft lip seal pointing down. Make certain pump is securely clamped in the vise. DO NOT clamp pump in vise by the machine pilot ring on mounting flange (See Figure 83 & 84), it could damage the pilot ring and prevent pump from being mounted straight.

4. Install First Thrust Block . There are a total of four thrust block used, All four of these blocks are the same. They MUST be installed correctly to operate correctly. The Thrust block will have two different side, one side is smooth (Gear Side) and the other side will have a seal groove in it (Seal Side). The smooth side will always be against the gears. The seal groove side will always be against the flat surface of the Mounting flange, middle spacer plate and end cap (See Figure 85). There is Plastic Back-up seal that will fit into thrust block seal groove and there is rubber channel seal that will fit into the back-up seal, these will never be installed on the gear side of thrust block. Light grease or petroleum jelly can be used to hold seals in thrust block during assembly. IMPORTANT ! The Thrust block MUST be installed to get the correct rotation out of the pump without blowing the seals. When installed correctly the CENTER (See Figure 85) of the Back-up and Channel seal must point toward the Low Pressure side (Suction Side) of the pump. Aligning the Block and seals set the Thrust Block down onto the mounting flange aligning top hole of block with hole in mounting flange (See Figure 86). NOTE: The low pressure (suction Side) of pump will always be on the drivers side when pump installed on tractor.

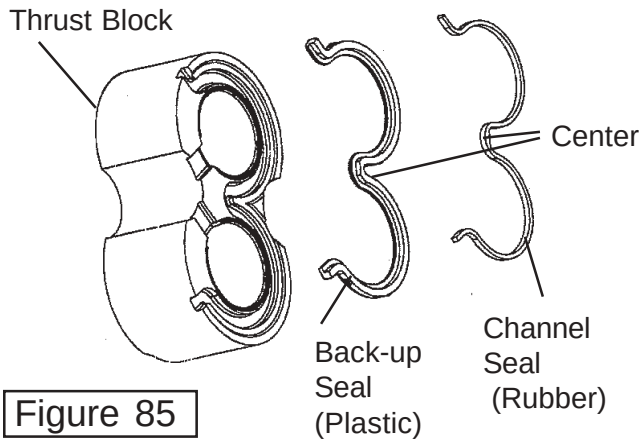

Figure 85

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PUMP RE-ASSEMBLY

5. Gear Set Installation. There is a drive gear and a driven gear. The first section of the pump is the large gear section. Coat the input shaft with petroleum jelly where shaft goes through the lip seal in mounting flange. Carefully insert the drive gear & input shaft down into the thrust block. Be careful not to damage the lip seal. Lower the driven gear into the thrust block (See Figure 87)

6. Install Lower O-Ring Seal into Gear Housing. Install the O-Ring Seal into the gear housing, a coat of light grease will hold O-Ring in place during assembly. The Gear Housing must be installed where the suction port is on the drivers side when pump is mounted (See Figure 87).

7. Install Short Dowel Pins between Mounting Flange and Gear housing. There are two dowel pins that go between the gear housing and mounting flange. Some time when disassembled the pin will stay in the mounting flange or the gear housing. Check to make certain the two dowel pins are in the correct holes to allow the two components to fit together (See Figure 87).

8. Install Gear Housing over Gears. Slowly lower gear housing down over the gears, the thrust block is under the gears and will need to be aligned up through the gear housing. To align the dowel pins into the gear housing and mounting flange turn the gear housing until the holes align themselves. The Gear housing cannot be hammered on to force over the dowel pins, it will damage the gear housing. The housing can be tapped with a rubber mallet gently to help fit onto the dowel pins (See Figure 76 & 87).

9. Install Second Thrust Block into Gear housing. The upper thrust block will be installed into the gear housing with the smooth side down against the gears. Make certain the thrust block is installed correctly. (See Figure 87)

10. Install upper O-Ring Seal. Install the upper O-Ring Seal into the groove of the gear housing. Use a light grease to hold the O-Ring Seal in place.

11. Install upper Back up Seal. Install the back-up Seal (Plastic) into groove in thrust block. Make certain that the seal is installed with the center point of seal toward the low pressure (Suction) port

12. Install Second Channel Seal. The channel Seal (Rubber) installs into back-up seal in the same direction. (See Figure 87).

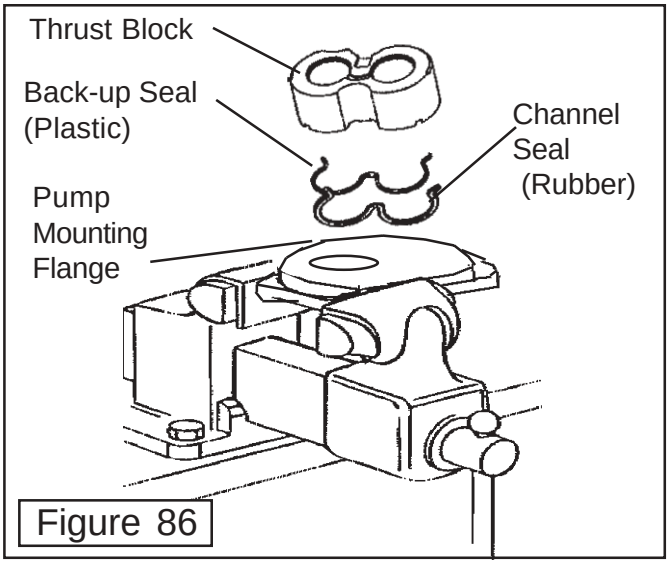

Figure 86

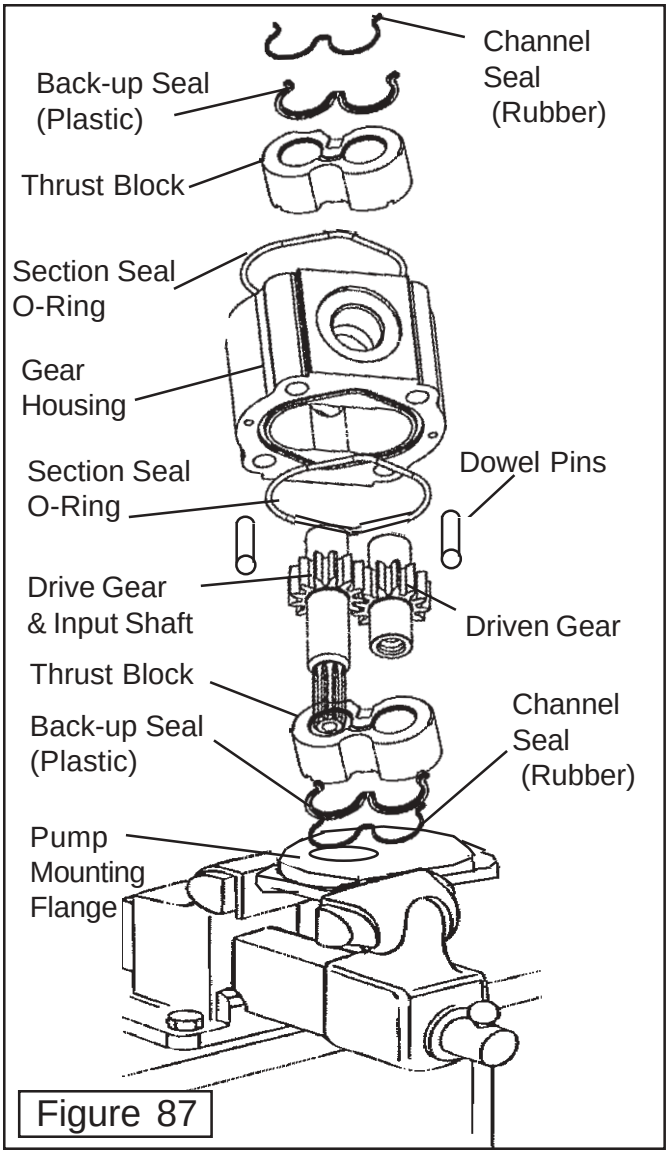

Figure 87

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PUMP RE-ASSEMBLY

13. Gear Connecting Shaft Installation. There is a splined stub shaft that connects the two pump sections together (See Figure 88). Drop the stub connecting shaft into the drive gear of the first gear.

14. Install Long Dowel Pins. There are 2 dowel pins that will install into the primary gear housing. Install these pins into gear housing. (See Figure 88)

15. Middle Space Plate Installation Make certain the O-Ring Seal, The Backup Seal (Plastic) and the Channel Seal (Rubber) are still in place (See Figure 76, 87 & 88). Lower the middle spacer plate down aligning the two dowel pins with the two end holes in spacer plate. (See Figure 88). The stub connecting shaft will be sticking up through the spacer plate when it is installed.

16. Install Seals and third Thrust Block. The Backup Seal (plastic) will insert into the thrust block, use a light grease to hold it in place. Insert the channel seal (Rubber) into the backup seal using light grease to hold it in place. Make certain the thrust block is in the right direction with the center of the two seals pointing toward the low pressure (suction) side of pump and the smooth side of the thrust block toward the gears.

17. Install The Small Drive Gear and the Driven Gear. Push these gears into the thrust block making certain the thrust block seals are not moved and the drive gear is slid down over the stub connecting shaft. Remember the smooth side of the thrust block goes against the gears (See Figure 88).

18. Install Gear Housing. Install the lower O-Ring seal into the groove of the gear housing Install the gear housing down over the gears and the thrust block. Make certain the seals for the thrust block is in correct (See Figure 88)

19. Install Seals and Fourth Thrust Block. The Backup Seal (plastic) will insert into the thrust block, use a light grease to hold it in place. Insert the channel seal (Rubber) into the backup seal using light grease to hold it in place. Make certain the thrust block is in the right direction with the center of the two seals pointing toward the low pressure (suction) side of pump and the smooth side of the thrust block toward the gears (See Figure 88).

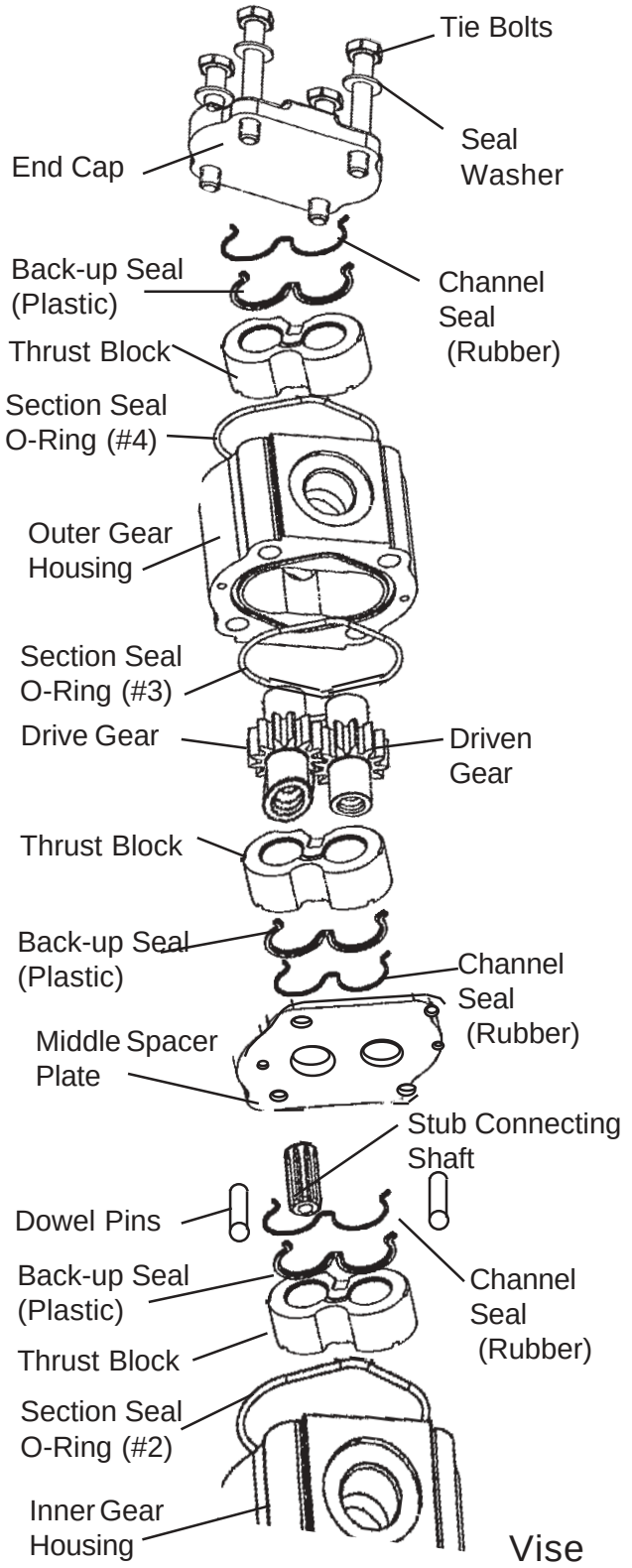

Figure 88

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PUMP RE-ASSEMBLY

20. End Cap Installation. The end cap has four bolts that will have a sealing washer on each one. If these washers were removed reinstall them (See Figure 88). Lay the end cap down onto the gear housing. Install the four tie bolts with the seal washer on them into the four holes. Start each Bolt DO NOT use an air impact to assemble this pump. Tighten each bolt by hand until all the slack is out and all components touching each other. Torque the four bolt in a cross (See Figure 89) pattern to 100 in lbs. Reset torque wrench to 250 inch lbs. and tighten four bolts again in the cross pattern. Reset the torque wrench again to 420 inch lbs (35 ft. lbs) and finish tighten the four bolts in the cross pattern (See figure 89). DO NOT TIGHTEN any one bolt at one time, you will damage the pump. The more steps used to tighten bolts the better the chance the components are tightened squarely.

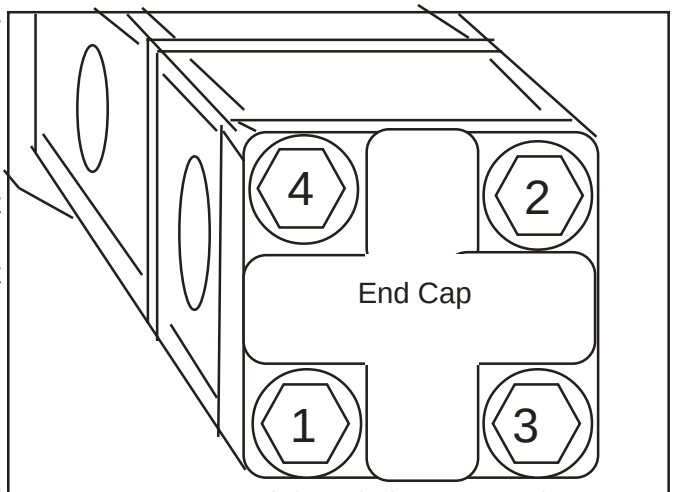

Figure 89 Tighten in increments in a cross pattern as shown

21. Install Pump Back on Tractor. Align the pump shaft with the drive shaft coupler and slide pump in until the pump is seated, the pump mounting flange machined pilot ring must be into the machined center hole of the pump mount plate, which is bolted to the tractor. Do not use excess force to make pilot ring go into the mounting plate. Pilot ring should only fit tight enough to hold pump straight. If pump is straight install the two pump mounting bolts and tighten them down alternating from one to the other until they are both tight and the pump is mounted straight. (See Figure 90).

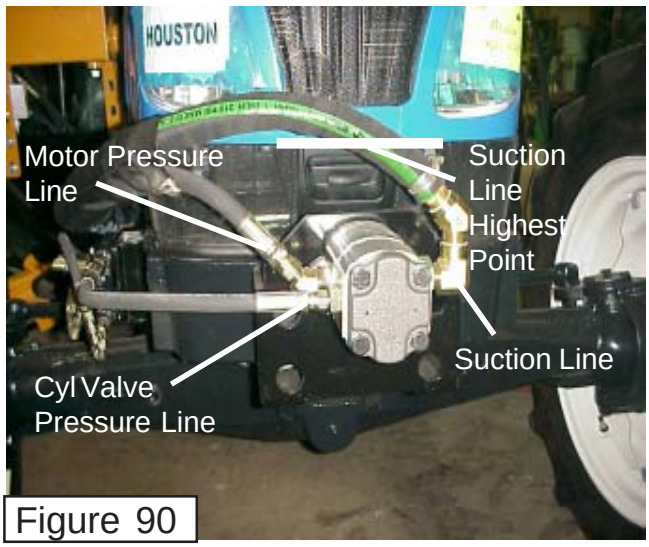

Figure 90

22. Re-Connect Hoses and Fittings. Reinstall the fittings for the hoses the same way they came out of the pump (See Figure 90). Connect the suction hose onto the hose bib at the pump. At the tank end pour clean oil until it is full to about the hoses highest point, any higher the oil will run out when connecting hose to oil tank. Reconnect other end of suction hose to tank.

23. Refill the Oil Tank. Refill the oil tank with the approved hydraulic oil. Make certain that all oil used is clean, new and free of contamination. There are commercial Oil Filter buggies available on the market that will filter and clean the oil before it is put into a hydraulic tank. The filter buggy is recommended for adding oil to hydraulic tank.

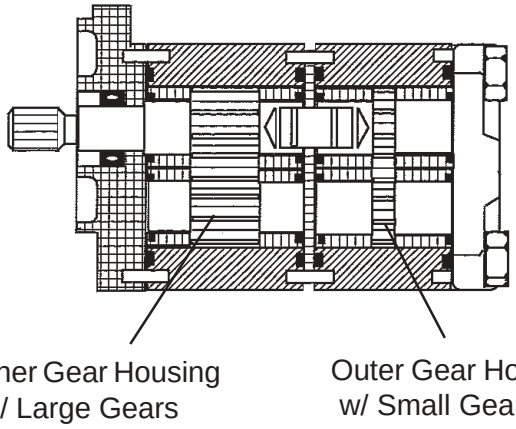

Figure 91

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Section 6

Hydraulic Tank & Return Filter

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HYDRAULIC TANK REPAIR

INTRODUCTION:

This Section of Book provides service information for the Hydraulic Tank. Step by Step instructions for the complete disassembly and reassembly of theTank are given. In Most diagrams there are no Component Part Numbers Listed, Only Item numbers and Descriptions, This is because most parts shown as breakdown in drawings are for location & identification only and may not be available as replacement parts. NO Dirt at all should be around Parts during repairs.

BEFORE STARTING REPAIRS: Service Rules (READ THIS)

1. Clean Hydraulic Tank and surrounding area completely before removing any connections or Lines. NO DIRT OR DEBRIS CAN BE ALLOWED ON OR NEAR HYDRAULIC SYSTEM IF IT IS BEING WORKED ON, ANY DIRT OR CONTAMINANTS IN SYSTEM NO MATTER HOW SMALL WILL DAMAGE SYSTEM!
2. After cleaning around all connections thoroughly, Disconnect all connections, Lines, Hoses, Wiring and Remove the. Plug all hoses and Lines on system that are disconnected, DO NOT leave any open Lines. NO Contamination Should be allowed into system at all.
3. Clean Area, Clean all Tools, Pans etc. The cleaning of Area and Tools MUST be done before moving (Cleaned) Pump there. Drain Oil from Pump, Recheck outside of Tank to Make Sure it is Clean
4. After disassembly of components wash all metal components in clean solvent.
5. Use compressed Air to dry parts after washing (Compressed air must be filtered and moisture free). DO NOT wipe them dry with Paper Towels or Cloth as these will leave lint and/or dust contamination. DO NOT USE Compressed Air to spin any component (Such as Bearings or Plates) as this will damage them and could be dangerous.
6. Always use new Seals when reassembling components, Lubricate rubber Seals with a Petroleum Jelly, (Vaseline) before installing them this will help hold them in place during assembly.
7. DO NOT reinstall worn or damaged Parts back on Tank, DO NOT Use a worn or damaged tank component.
8. Torque all Bolts over Gasket Joints. Then repeat the Torque sequence to make sure Bolts are tight, some times Gaskets can give a Torque reading that is OK but is not, so always recheck Torque.

RECOMMENDED TOOLS:

1. Retaining Ring Pliers
2. O-Ring Pick (Qty 1)
3. End Wrench (Qty 4), 1 each of 7/16", 9/16", 3/4", 1"
4. Torque Wrench (Qty 1), 0 to 1200 in. lbs.
5. Hammer, Soft Face (Qty 1)
6. Seal Driver Set (Qty 1)
7. Socket Set (Drive Size should match Torque Wrench Drive)
8. Light Petroleum Jelly (Vaseline)
9. Locktite, # 222 and #277 or equivalent (Qty 1 tube each)

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HYDRAULIC DIAGRAM - SINGLE RH WING

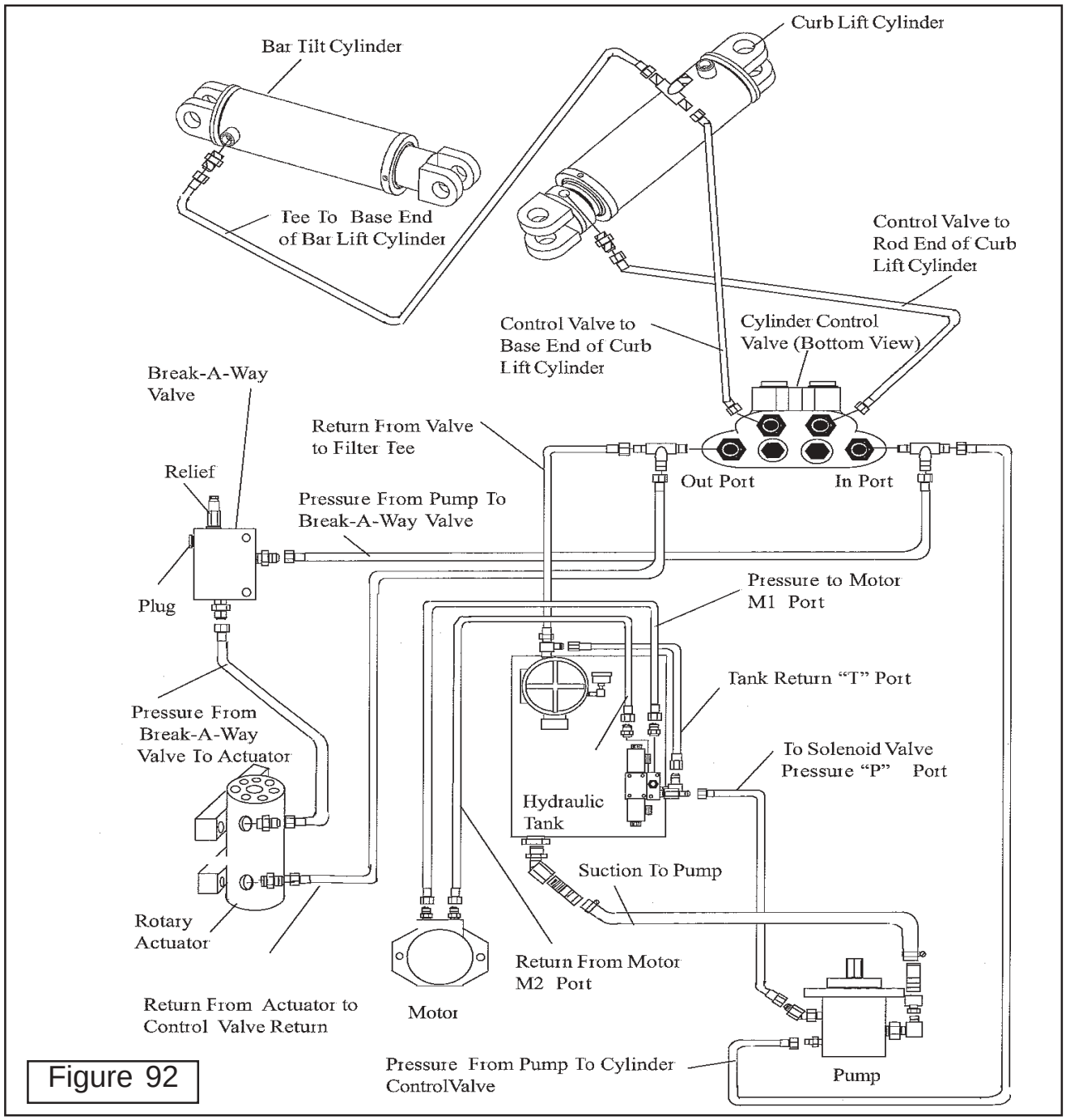
Curb Lift Cylinder
Bar Tilt Cylinder
Tee To Base End of Bar Lift Cylinder
Control Valve to Rod End of Curb Lift Cylinder
Control Valve to Base End of Curb Lift Cylinder
Cylinder Control Valve (Bottom View)
Break-A-Way Valve
Return From Valve to Filter Tee
Relief
Out Port
In Port
Pressure From Pump To Break-A-Way Valve
Plug
Pressure to Motor M1 Port
Tank Return "T" Port
Pressure From Break-A-Way Valve To Actuator
To Solenoid Valve Pressure "P" Port
Hydraulic Tank
Suction To Pump
Rotary Actuator
Return From Motor M2 Port
Motor
Return From Actuator to Control Valve Return
Pressure From Pump To Cylinder ControlValve
Pump

Figure 92

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HYDRAULIC DIAGRAM - DUAL LH WING

Shown below is the Hydraulic Diagram for the Dual Wing Model

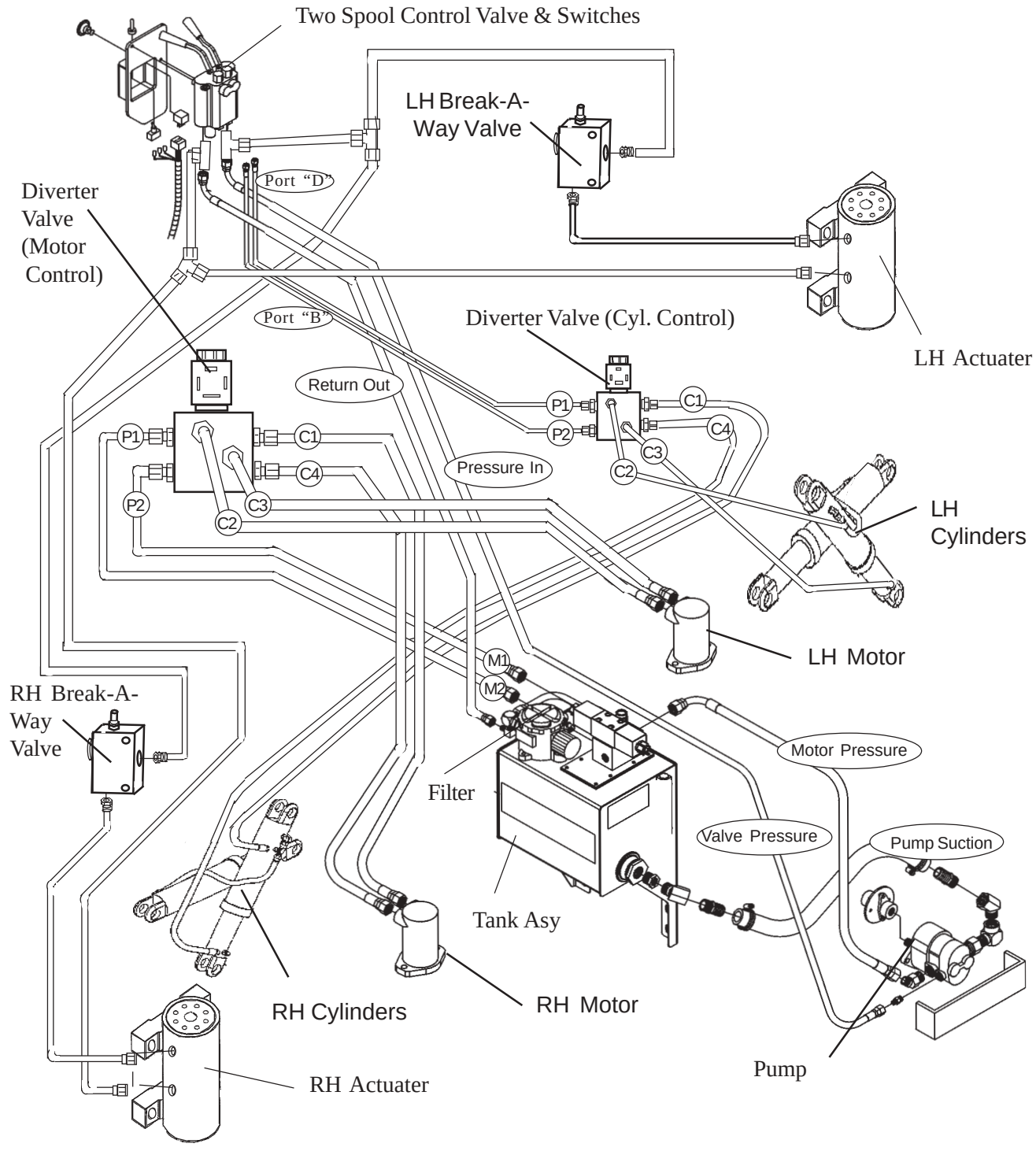

Figure 92A

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HYDRAULIC TANK SCHEMATIC

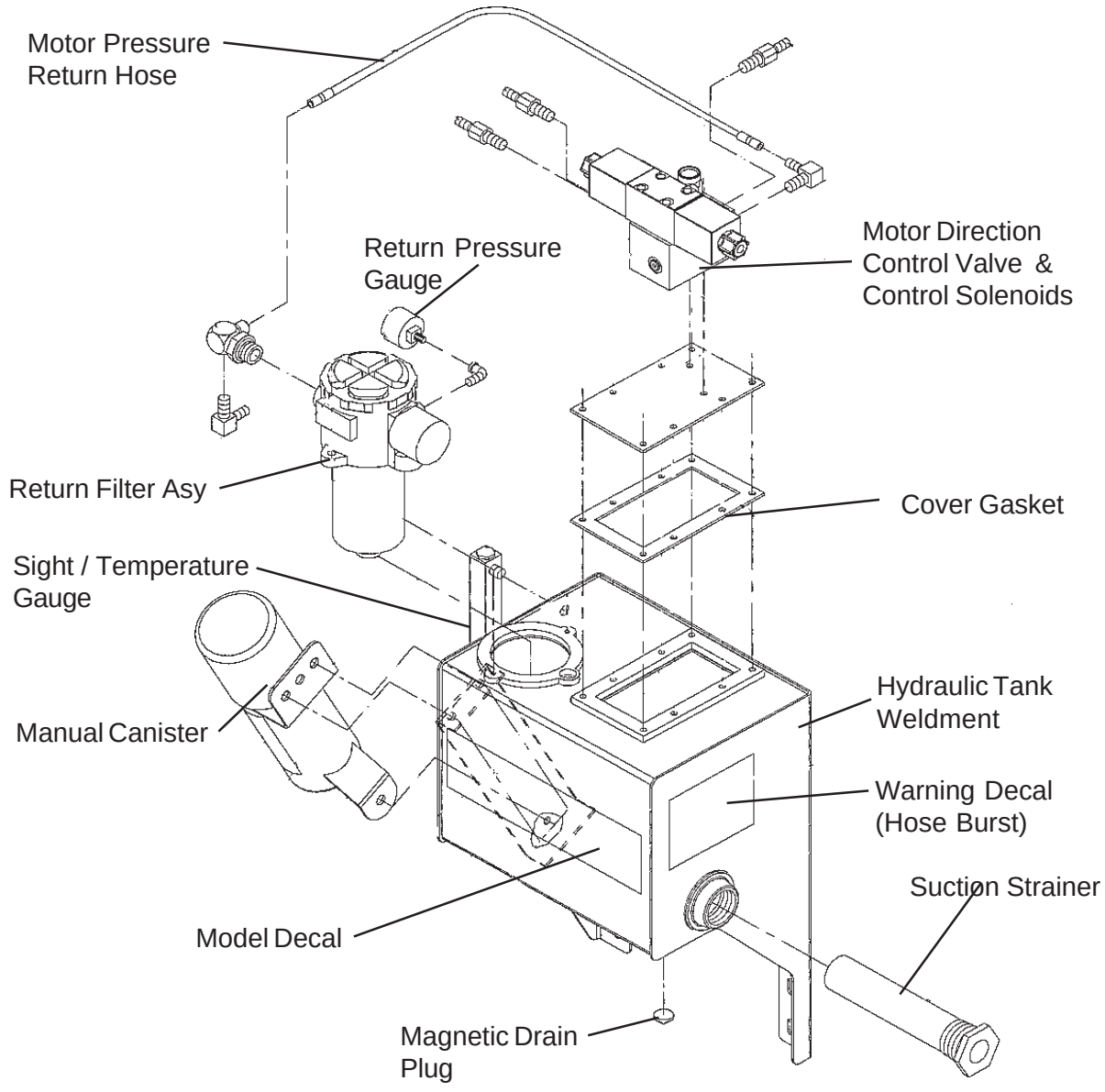

Figure 93

Oil Return Filter:

The return filter assembly is bolted into the top of the tank. The filter has a replaceable cartridge that is accessible by removing the top cover of the filter assembly. The filter Assembly WILL NOT require removal from the tank assembly (See Figure 93 & 94). The filter has a oil pressure return gauge. This is designed to monitor the return pressure of the oil as it is returned to the return filter. It is measured on a green & red scale on the gauge, green being ideal return pressure and red being return pressure is to high. When checking this make certain that the oil is up to operating temperature. Cold oil can show a high return pressure because the oil is thick from the temperature being cold. The Breather cap is mounted to the filter assembly. The breather has replaceable components that are available in a kit.

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HYDRAULIC TANK REPAIR

The Breather cap is mounted to the filter assembly. The breather has replaceable components that are available in a kit or the complete breather assembly can be replaced. DO NOT operate if breather asy is plugged or missing (See Figure 93 & 94).

Oil Level / Temperature Sight Gauge:

The oil level / temperature sight gauge is located on the side of the tank. The mounting bolts for this gauge screw directly into the tank. These are special bolts that will only work with this gauge. Do not remove these bolts if tank has oil in it because the oil will run out of the bolt hole. If gauge has to be removed the oil level will have to lowered until it is below the bottom mounting bolt (See Figure 95 & 96).

The clear area around the temperature gauge will show the oil level in the tank (See Figure 96)

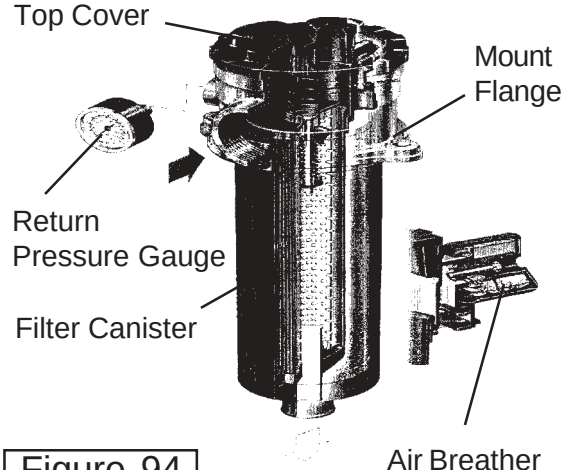


Figure 94

Suction Strainer:

The suction strainer is screwed into the bottom side on the tank (See Figure 93 & 95). To replace this the oil will need to be removed from the tank and the suction hose will need to be removed. The suction Strainer will screw out of the tank and the replacement will screw back in. Inspect the strainer when it is removed as this will give a good indication on what contamination may be in the tank.

If tank needs to be washed out, it is best to remove the other components from the tank to prevent contamination from getting into them. It is best to use a non petroleum base solvent, the tank should be allowed to air dry before reassembling it after it has been cleaned. Replace all gasket when reassembling tank.

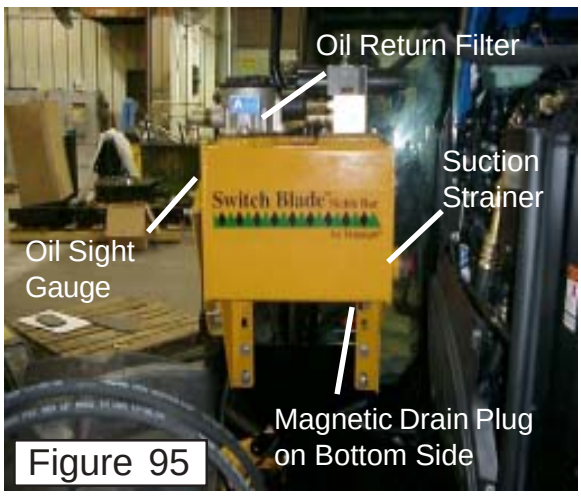
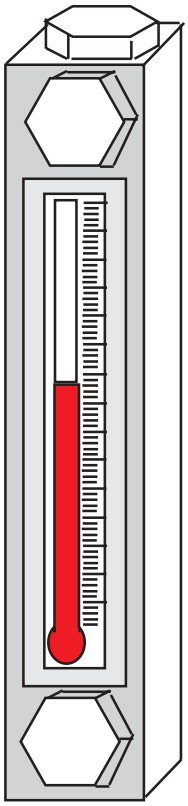


Figure 95



Oil Level & Temperature Sight Gauge

Figure 96

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Tank Access Cover & Gasket:

The tank access cover uses a gasket to seal the cover to the tank. To remove this cover for any reason it is best to remove the motor direction control valve / solenoids assembly. It will not be required to remove the hoses as the valve can be set off to one side. Replace with a new cover gasket and bolt back down to the tank using an alternating cross pattern so the cover bolts down evenly. Bolt the valve / Solenoid assembly back into place (See Figure 97)

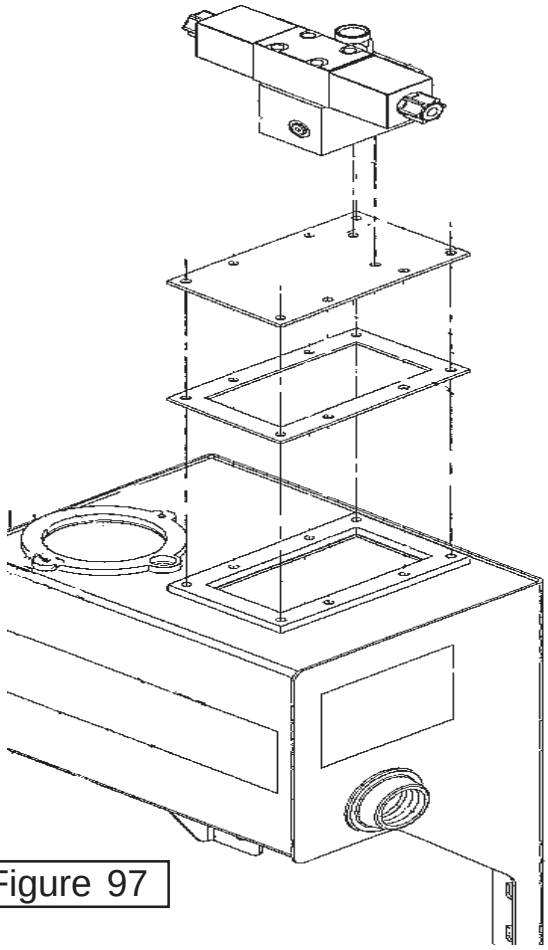

Figure 97

Motor Control Valve / Solenoid:

The motor control valve is a solenoid operated electrical activated directional valve. It is designed to reverse the flow of oil pressure to the motor and thus reverse the direction of travel. This is used to unclog the cutter blades, other than that there is no advantage to reversing the blade direction. The Solenoids can be removed and /or changed without removing the control valve or the valve connections. There is a nut on the end of the solenoid that when removed will allow the coil and tube assembly to be removed. The solenoid can be replaced as an assembly or by parts. The wire harness plugs will have to be disconnected from the coils. There are no adjustments to the solenoid or valve (See Figure 98).

To test the solenoid this can be done with a test light or a volt meter. Test the wire harness first to make sure that the connections are good and there is current present. REMEMBER the solenoids are connected to the toggle switch which means only one solenoid id energized at a time, and this is determined by the toggle switch. If you check one solenoid and it has current then check the other solenoid at the plug, you will need to flip the toggle switch to energize the other coil.

The coil can be tested by using a small paper clip. Remove the solenoid coil retaining nut. Energize the coil and stick the small paper clip to the end of the stem sticking out of the coil. The paper clip should stick to the stem magnetically and fall off when the coil power is shut off. Note: use a small paper clip or small wire as the magnetic pull of coil is very low and will not carry a heavy weight. The coil is working properly if it held the paper clip.

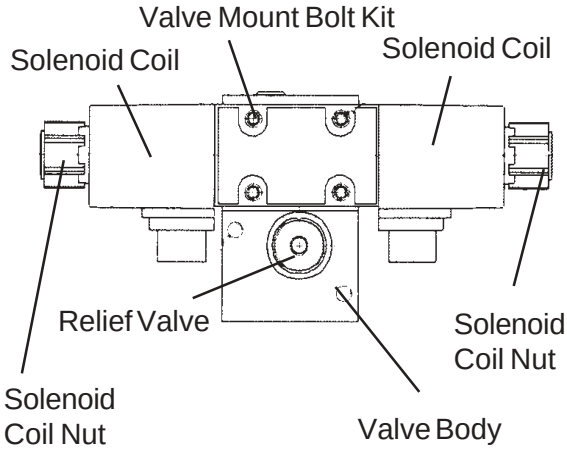

Figure 98

If all the test show to be OK, check the stem that screws into the valve body, The best way to check this is to try a different one, the other one on the other side of valve can be switched or a new one can be tried. When removing the stem inspect it when you get it out to see if there is something stuck in it.

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NOTES

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NOTE

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TO THE OWNER/OPERATOR/DEALER

To keep your implement running efficiently and safely, read your manual thoroughly and follow these directions and the Safety Messages in this Manual. The Table of Contents clearly identifies each section where you can easily find the information you need.

The OCCUPATIONAL SAFETY AND HEALTH ACT (1928.51 Subpart C) makes these minimum safety requirements of tractor operators:

REQUIRED OF THE OWNER:

1. Provide a Roll-Over-Protective Structure that meets the requirements of this Standard; and
2. Provide Seatbelts that meet the requirements of this paragraph of this Standard and SAE J4C; and
3. Ensure that each employee uses such Seatbelt while the tractor is moving; and
4. Ensure that each employee tightens the Seatbelt sufficiently to confine the employee to the protected area provided by the ROPS.

REQUIRED OF THE OPERATOR

1. Securely fasten seatbelt if the tractor has a ROPS.
2. Where possible, avoid operating the tractor near ditches, embankments, and holes.
3. Reduce speed when turning, crossing slopes, and on rough, slick, or muddy surfaces.
4. Stay off slopes too steep for safe operation.
5. Watch where you are going - especially at row ends, on roads, and around trees.
6. Do not permit others to ride.
7. Operate the tractor smoothly - no jerky turns, starts, or stops.
8. Hitch only to the drawbar and hitch points recommended by the tractor manufacturer.
9. When the tractor is stopped, set brakes securely and use park lock, if available.

☑ **Keep children away from danger all day, every day...**

☑ **Equip tractors with rollover protection (ROPS) and keep all machinery guards in place...**

☑ **Please work, drive, play and live each day with care and concern for your safety and that of your family and fellow citizens.**

Switch Blade 5 ft. & 6 ft (02/05)

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